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Minister and Companies

Case for Nationalization Not Proved

RUMOURS that the Minister of Fuel and Power and the representatives of the electricity supply companies did not see eye to eye at their meeting in June are confirmed by subsequent correspondence between the parties which has been made public. It will be seen from the extracts published in this issue that Mr. Shinwell had assumed that, although the companies naturally opposed nationalization, they would be willing to put their experience at his disposal to assist him in framing proposals for the forthcoming Bill. He invoked in this connection the national interest and the future interests of the electricity supply industry and its employees.

Definite Decision Wanted

The June discussion made the Minister "very doubtful" whether the companies' associations were prepared to assist him and he asked them to state definitely whether or not they were prepared to give him the benefit of their advice and experience. For this purpose he suggested that they should elect a small consultative committee which would not commit the nominating associations.

The associations have declined to accede to this request on the ground that the election of such a committee "would give rise to misconceptions as to the position and attitude of those taking part in the consultations." Indeed, it is difficult to see how this could be avoided. The Minister should have had by now all the technical advice he needs and in any event he still has his advisers. The associations' nominees could only be usefully consulted on matters of policy and any opinions which they expressed would inevitably be regarded as the views of the companies: they would be "company" men if not representatives.

Suppose, for instance, that the question of compensation or terms of purchase came up. They would be expected to give some indication of their ideas on the subject. If they did it could easily be claimed that the companies accepted the principle of compensation, and thus the idea of nationalization, when, in fact, they still maintain that no case for nationalization has yet been disclosed. This was made clear in their reply to the Minister in which they said that the policy of nationalization had yet to be debated in Parliament and subjected to public criticism. The Government was called upon to disclose its proposals and show the grounds on which it claimed its policy to be in the interests of the nation and the industry before inviting the companies to confer with it.

"Cheap and Abundant"?

This is of course an interested view; the companies represent private enterprise. But, leaving them aside, it is tolerably certain (to put it mildly) that upheaval will not bring improvement. It is difficult to see how nationalization (which would proceed concurrently with "co-ordination" with gas) could develop the supply more rapidly and efficiently than the present methods.

The Government's claim to have a "mandate" for the nationalization of

electricity supply is of doubtful validity but if it has, the electorate must have believed that nationalization meant improvement. Nevertheless it has been suggested that the price of electricity should be increased to discourage its use, in view of the serious coal situation. But coal has been short for some years now and the prospects of better supplies are not bright. Will the new argument be that nationalization is necessary to prevent the undue use of electricity, in which case what future is there for the British Electrical Development Association?

Summer Heating

INCREASES in maximum demand that accompany falls in temperature in winter have often been noted, but fewer particulars are available regarding summer months. The comparative load curves sent us by Mr. E. A. Logan and included in our Correspondence section indicate an even greater influence of space heating load on a day in July when the weather conditions were approximately those of a mild January. The difference in demand between the two dates in July expressed in kW per deg F, is seemingly greatest at about the peak load, which is the factor of most importance.

Gas Turbines

IT is not surprising in view of the past history of the company that Parsons should have taken up the manufacture of gas turbines, as indicated in an article in this issue. Recent progress in metallurgy is said to have produced metals capable of standing up for economic periods to the high temperatures required to obtain efficiencies comparable with those found in steam practice. So far about 10,000 kW appears to be the relatively low upper limit of capacity envisaged and present designs preclude the use of coal. On the other hand the use of gas turbines is not dependent on the availability of copious water supplies as are other internal-combustion engines and steam turbines.

Marine Propulsion

THE pilot unit running at Heaton is for a stationary installation, but the company's association with marine work suggests possibilities in this direction. Any move of that kind would favour electric propulsion of ships, since astern turbines, which would have to rotate in hot gas at atmospheric pressure, would suffer from high rotation losses and heating of discs and buckets. In our issue of February 8th we referred to the work of the B.T.H. Co. in this field, following up its experience in the development and manufacture of the Whittle jet-propulsion engine. It is significant that both companies have had long experience in building air compressors, as one of the major obstacles to earlier progress was that this component absorbed almost the whole output of the turbine.

International Co-operation

ANOTHER sign of return of normal post-war relationships in engineering is the meeting of the International Electrotechnical Commission, a report of which appears in this issue. One of its immediate activities relates to flameproof enclosures, which has appropriately been entrusted to a committee with a British secretariat. The appropriateness lies in the work already done in this field by the British Standards Institution (which provides the national committee for the I.E.C.). An indication of the experience at its disposal is to be found in the commentary by Mr. J. A. B. Horsley in our issue of July 5th on the revised B.S. 229, which is based on investigations by the Electrical Research Association and the Safety in Mines Research Board.

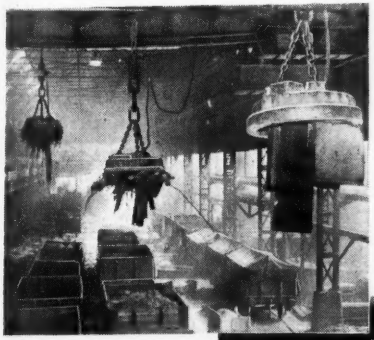
B.E.A.M.A. and Export

AT present it is not difficult to sell in most overseas markets almost anything which can be produced after meeting vital home needs. In three or four years' time the position will have altered, perhaps considerably, and our manufacturers will find themselves again in active competition with those of other countries. The consumer will once more be able to call the tune and we shall have to dance to it. Consequently steps must be taken now to prepare for that time by studying the needs of various markets and the idiosyncrasies of customers. The British Electrical and Allied Manufacturers' Association fully realises this and is setting up an Export Section under the direction of Mr. D. M. Buist, M.I.E.E. One of the first moves will be to arrange for Mr. Buist to visit some of the principal export markets at an early date.

Steel Slab Production

Electrical Applications to Steel Making and Slab Rolling in a Large Works

IT is proposed in this article to describe the electrical applications to the first parts of the processes, namely, ingot production and slab rolling, which we saw recently in the very large steel works of John Summers & Sons, Ltd., at Shotton, Chester, where sheet steel is produced right from the early stages of melting the raw materials. The activities of a group of companies controlled by John Summers & Sons include the production of pig iron and steel, and section rolling at the Shelton Iron, Steel & Coal Co., Ltd.; making steel ingots, slab and sheet steel rolling at Shotton; and the production of refractory materials at Buckley. Products of the Shelton and Buckley works are used extensively at Shotton.



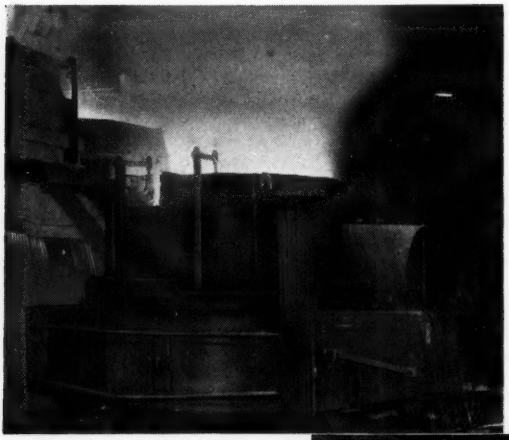
In the scrap bay all ferrous material is handled by circular lifting magnets suspended from high-speed cranes

The main raw materials of the Shotton works are pig iron and steel scrap, which are rail and river borne to the works. To refer to one only of the steel-making plants at Shotton, the raw materials are generally received in a scrap bay adjacent to the furnace building, although the bulk of the lighter material is bundled in electrically driven screw-type presses outside the bay. Inside the scrap bay all the ferrous material is handled by standard circular lifting magnets suspended from high-speed cranes, ranging from five to ten tons in capacity. All the non-magnetic material is loaded into steel boxes ready for charging. The magnets in this bay range from 52 to 55 inches in diameter, and have lifting capacities of up to 1½ tons, depending on the type of material being handled. In common with the crane motors, the magnets are supplied from the works 230-V d.c. distribution system. The cranes and magnets deliver their loads on to the furnace loading stage in the melting shops, in which are eight 70-ton and nine 60-ton basic open-hearth regenerative furnaces in Nos. 1 and 2 shops. These are fully electrically instrumented for the measurement and recording of temperatures, gas and air flows, chimney draughts and furnace pressures.

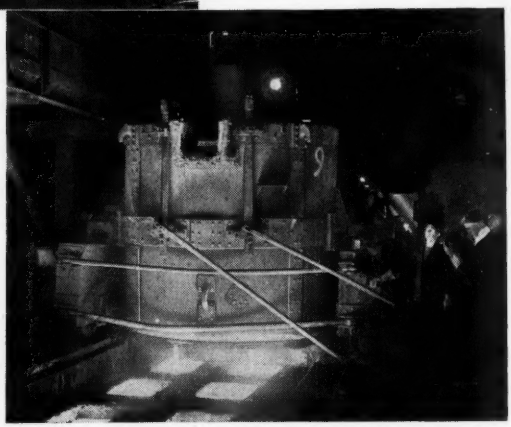
The furnaces are charged by means of both overhead and floor chargers, each of 3 tons capacity. Each overhead charger has five motions, i.e., travel, traverse, slew, rocking hoist and ram turning. Rocking hoist involves engaging the charging box

Each overhead furnace charger has five motions—travel, traverse, slew, rocking hoist and ram turning

by a tipping action of the ram, while ram turning is the actual turning of the box upside down inside the furnace. Each motion is separately motor driven, and in all cases transmission is through reduction gearing, while in the case of the rocking hoist drive there is a final transmission through a crank mechanism. The molten metal is tapped from the back of the furnace into a ladle before teeming, that is, running



Above and right: During tapping and teeming the molten metal ladle is mounted on a carriage with a single travelling motion



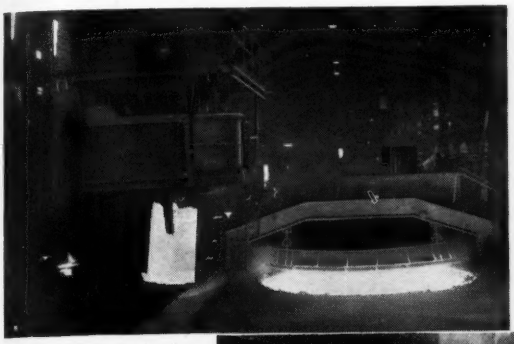
out the molten metal into moulds. The molten metal ladle is mounted on a "carriage" with a single travelling motion, and it takes its electricity supply from an overhead trolley wire system by means of trolley booms and collector wheels.

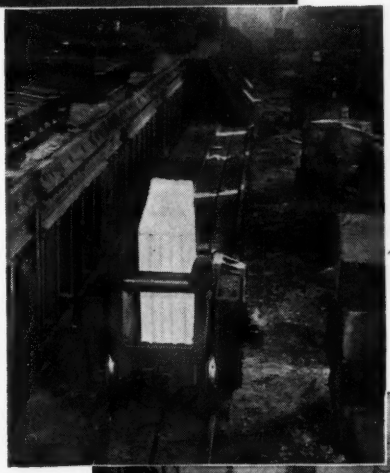
The carriage has a 30-H.P. driving scheme, and there is special protection of the ladle electrical gear from splashes of molten metal and slag from the ladle. All the wiring is carried out in special heat-resisting cable.

The ingots, weighing about 6½ tons each, are stripped from their moulds by a 7-ton overhead electric stripper, and are charged as soon as possible directly into soaking pits in order to conserve the heat. The electric stripper is a 5-motion overhead crane with jaws which engage the ingot mould and a central ram which pushes the ingot from the mould at a pressure of several hundred tons, if necessary. The size of the stripper may be gauged by the fact that the hoist motion is served by a 125-H.P. motor. The ingot re-heating furnaces, or soaking pits, into which the hot ingots are charged, are of two types, four of them being circular Salem and four square Amsler Morton equipments. They are all fired with producer gas supplied from a battery of Morgan gas producers, and the exhaust gases are passed through waste-heat boilers. The soaking-pit covers are handled by two-motion electrically driven cranes which run on a wide rail track and are supplied at 440 V, 3-phase, by overhead "T" bars and collector gear. Each crane has a travel motion and a crank-operated hoist motion. The control scheme embraces a complete system of electrical interlocks to prevent incorrect operation of the lifting and travelling motions.

The interlocking is carried out through hatchway-type limit switches actuated by a bar carrying a roller at the bottom and running on a special track with four levels. The change in the relative positions of the roller consequent on the different levels on the track results in the operation of the limit

switches and thereby selects the appropriate circuit interlocks. An interesting electrical feature of the soaking pit plant is a manually





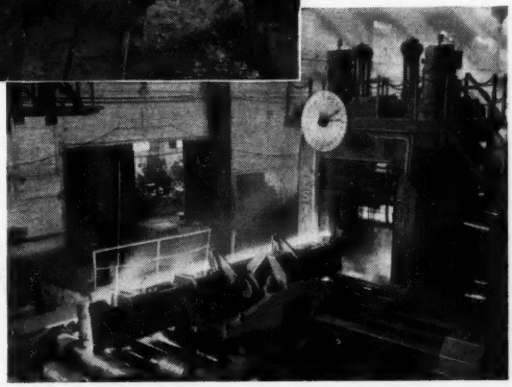
Above: The soaking pits into which the hot ingots are charged have covers which are handled by two-motion cranes.
Right: The ingots are carried to the slab mill on an ingot bogie which is operated by a rope-haulage scheme

operated control scheme which automatically closes the gas and air supplies to each pit immediately before the cover is lifted, and restores the supplies when the cover is replaced. The soaking pit and slab mill are served by two 7-ton overhead ingot charging cranes which each have five motions —travel, traverse, hoist, grip and slew. The crane lifts the ingot by means of two steel jaws.

The ingots are carried from the soaking pits to the slab mill on an ingot bogie which is drawn by an endless rope haulage system driven by a 15-H.P. motor. Track-type limit switches are used at each end of the track, and at the mill the ingot bogie tips the ingot automatically on to the mill approach table.

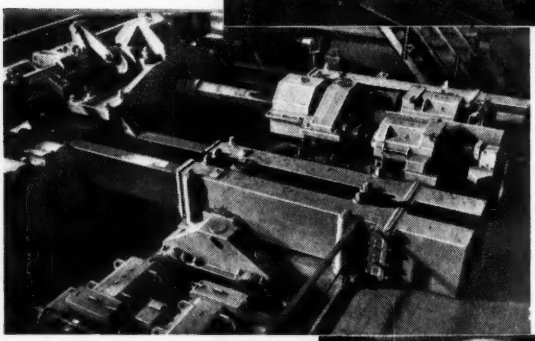
The slab mill is a modern reversing equipment with rolls 36 in. in diameter and weighing 16 tons each. The mill is driven by a three-cylinder steam engine and has a nominal capacity of 150 tons of slabs per hour. The finished slab dimensions are 3½ to 5 in. thick, 22 to 39 in. wide, and 6 to 15 ft long. At the front and back of the mill are manipulators for guiding the ingot during rolling and manipulator fingers for turning the ingot through 90 degrees for the edging passes. The principal auxiliaries on the slab mill, i.e., the left and right manipulators, the front and back tables, the screw-down gear and the slab shear, all have Ward-Leonard control, and owing to the number of generators required for this there are two multi-generator m.g. sets each having 6·6-kV synchronous driving motors.

The left and right manipulators and the front and back tables are each served by two 150-H.P. mill-type motors, permanently connected in series, which are supplied by a 135-kW variable-voltage generator. The screw-down gear



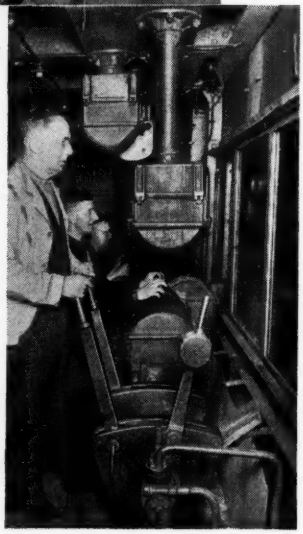
The slab mill is a modern reversing equipment with 36-in. diameter 16-ton rolls

has a 100-H.P. motor which is supplied by a 75-kW variable-voltage generator, and the slab shear is driven by a 600-H.P. motor which is supplied by a 480-kW variable-voltage generator. In the case of the manipulator and table drives, all the motors are operated at half voltage, and consequently half speed, in order to provide low inertia and quick acceleration. All the generators are of special three-field construction, i.e., a separately-excited shunt field, self-excited shunt field, and a differential series field, and by this scheme quick response, coupled with inherent protection against overloading, is provided.



The slab mill auxiliary motors are supplied by 6.6-kV synchronous motor driven multi-generator m.g. sets

All the principal auxiliary motors and their generators are forced ventilated from a fan supplying 40,000 cu ft of air per minute, passed through a "Visco" rotating oil filter. The mill is controlled electrically from a cabin astride the roller table on the inlet side of the mill, and the cabin is air conditioned with air bled from the ventilating systems. Consequent on the Ward-Leonard control scheme, the controllers themselves are very simple and merely operate the directional contactors which directly control the generator shunt fields. The run-out tables from the mill to the shears, and then on to the pusher and piler, have individually driven live rolls with 1-H.P., 72-r.p.m., 11-cycle motors. These motors are directly switched in groups varying from eight to twelve, and each motor has its individual cut-out with thermal over-current protection. The 11-cycle a.c. supply for these is derived from a 385-kVA synchronous motor-driven alternator, selection of the low frequency being consequent on the necessity of obtaining a low-speed directly-coupled drive for each roll.



The slab mill is controlled electrically from a cabin astride the inlet roller table

The slab as delivered from the mill is up to 30 ft long, and it is cut into two, three, four or five pieces by an electrically driven up-cut shear. The shear motor is of 600-H.P. and is Ward-Leonard controlled. It has to start and

stop for each cut, and the correct stopping position is selected by a cam-type limit switch. The drive to the shear is through a double-reduction gear, and then through a crank mechanism, and the whole cycle for each cut takes about six seconds. The crop end cuts from the back and front ends of the slab are removed from the table by electrically driven pushers into scrap boxes below floor level, and the prime slab passes along the roller table to the piling machine. This consists of a pusher which skids the slabs on to a pile from which they are taken by crane to the weighing machine, and then to the slab stock bay where they are allowed to cool before inspection. The piling machine is driven by a 40-H.P. motor. The complete slab mill electrical auxiliaries, including the motor-generator sets and the mill-type motors, were supplied by the General Electric Co., Ltd.; the crane motors are products of Laurence, Scott & Electromotors, Ltd.; the control gear on the soaking-pit cover-lifting cranes, ingot chargers and the stripping crane was made by Contactor Switchgear, Ltd.; and other auxiliary control gear was supplied by the Igranic Electric Co., Ltd.

We are indebted to Mr. A. Reith Gray, director and general manager, John Summers & Sons, Ltd., for his ready response to our request for permission to visit the works and to publish this and subsequent articles, and to Mr. S. A. Lewitt, B.Sc.(Eng.), A.M.I.E.E., chief electrical engineer, and Mr. T. D. Martin, B.Sc.(Eng.), A.M.I.E.E., assistant electrical engineer, for their help in compiling the articles.

Municipal Reports

Bath

AT Bath, where Mr. E. A. Newburn has just taken up the position of city electrical engineer following the retirement of Mr. J.W. Spark, the annual accounts show a revenue of £501,200 (against £471,881 in 1944-45) and working expenditure of £490,728 (£419,299), leaving a gross profit of £10,472 (£52,582). After meeting loan charges, etc., there was a net loss of £28,969 in addition to which £10,436 was spent on items of a capital nature, etc., and the accumulated surplus at the end of the year was reduced from £71,656 to £32,251. Excluding bulk supplies of 88·1 million kWh (93·6 million), total sales aggregated 57·2 million kWh (54·2 million), the Department itself generating 15·1 million (23·4 million).

Hull

Some interesting figures are contained in the annual report of Mr. D. Bellamy, general manager of the Hull electricity undertaking. One table, for example, shows that last year the average price received per kWh sold—1·014d.—was exactly the same as in 1935, although the cost of fuel had more than trebled, rising from 10s. 1d. up to 37s. 2d. per ton. Under the domestic rate the average price per kWh sold was 0·864d. while large power consumers paid 0·782d. Total sales last year rose by 5·8 per cent to 279·8 million kWh.

In spite of a major breakdown to one of the sets 348·5 million kWh was generated, an increase of 1·5 per cent on the previous year. Considerable difficulties were experienced in running the plant effectively with the class of fuel supplied and the fuel consumption per kWh generated, at 1·498 lb, showed an increase on the previous year. Stocks at one time fell as low as 6,000 tons, little more than one week's usage. Extensions at the Sculcoates station comprising a new 30,000-kW turbo-alternator, with two boilers and a cooling tower, are expected to be in operation by the winter.

The gross revenue of the Department for the year was £1 208,877 and there was a net profit of £7,817 after providing for all charges, including £56,485 rates on the undertaking and £21,548 income tax. The surplus, together with £17,392 from the general reserve fund, has been used for expenditure of a capital nature.

We have also received from the general manager an illustrated booklet describing the wartime operation of the undertaking.

Leicester

The accounts of the Leicester undertaking (general manager, Mr. J. Mould) show a small decrease in gross revenue (from £997,796 in 1944-45 to £996,368 last year), while working expenses rose sharply from £747,912 to £880,820. The latter increase was partly offset by lower loan charges (£65,854 against £75,012) and income tax and special expenditure (£24,523 against £62,728). The net surplus, however, was reduced from £112,144 to £25,171.

Total sales were at about the same level as in the previous year (216·6 million kWh compared with 216·0 million), although there was a considerable rise in the maximum demand of the undertaking, from 79,860 to 86,160 kW. Revenue (electricity only) per kWh sold amounted to 1·060d. (1·057d.) and working expenses averaged 0·975d. (0·831d.). The Department generated 307·8 million kWh, a reduction of 70·8 million, the maximum demand on the generating station falling from 79,960 to 64,540 kW.

Views on the News

Reflections on Current Topics

APPLICANTS for the Leyland U.D.C.'s houses have had an opportunity of stating their preferences in the matter of equipment and as a result 441 have expressed a desire to have electric cooking and washing while 189 prefer gas, a vote of seven to three in favour of electricity. The Council intends to proceed with the equipment of its permanent houses on this basis. In sending me this news, Mr. N. H. Bridge, publicity manager of the Lancashire Electric Power Co., says that the ballot was taken after both his company and the Leyland Gas Co. had conducted educational campaigns. The Power Company hired a local cinema and invited the 630 prospective tenants to see E.D.A.'s latest film and the Gas Company retaliated with special showroom demonstrations. The result is good testimony both to the keenness of the Power Company and the common sense of the prospective tenants.

* * *

I see that the Edinburgh Gas Committee is a little perturbed at the proportion of new Corporation houses which are to be "all-electric" which it considers is "developing unfavourably to the Gas Department." And yet it appears the proportion is only "over 20 per cent of all temporary houses for which fuel services have been decided." This does not seem to me to be excessive—quite the reverse. It is up to the Gas Committee to convince the Housing Committee that it can do as well as the Electricity Department for some of the remainder of the Corporation's houses.

* * *

Although in these days of small rations the question hardly ever arises, I am glad to see that E.D.A. has been tackling the matter of cooker sizes. The small N.H.D. cookers are probably big enough at the moment but we are entitled to look forward to the day when there will be more to put into the oven and then the present cookers will prove too small for many large families. The manufacturers are willing to supply bigger cookers, provided the purchasers are willing to take the standard models and do not ask for special designs.

* * *

An E.D.A. questionnaire on the subject has discovered a very big demand for the standard service unit. Over 200 undertakings have stated that they will require a total of 250,000 in the next two years. Discussions regarding production and prices are being conducted with the manufacturers by a committee presided over by Mr. R. H. Harral, of Blackburn. E.D.A. points out that acceptance of the standard, avoiding personal preferences for special features, will keep the general price down. That is not to say that the present design will be perpetuated; the committee is keeping in close touch with practical experience in the use of the unit and such amendments will be made as experience shows to be desirable. So far no modification has been found necessary.

* * *

Alderman A. E. Gough, the Labour Chairman of Cardiff Electricity Committee, is by no means happy at the possibilities latent in nationalization proposals. Writing to the *Tribune* he asks why joint boards were "airily dismissed as a failure" by a contributor on the subject. He fears that the regional boards composed of "appointed," rather than "elected," persons will be mere instruments of the appointing Minister. "There is more danger to socialism from over-centralization than from 'local bias.'" He contends that the local authorities have done their job efficiently and could be trusted to carry on with powers over the areas at present undeveloped. He concludes:—"Let us have public ownership and *public* control. We are in danger of passing into the hands of regional 'Gauleiters' and 'Commissars' appointed by the Minister, all in the name of efficiency."

* * *

Though the smallest fluorescent tube generally available in this country is still 4 ft. (40 watt) quite minute models are now being made in the United States. The most recent unit is only about 1½ inches long in green or white and with a loading of only 1 watt is suitable for "safety" lighting in halls, passages, etc. It fits a standard lamp socket.

* * *

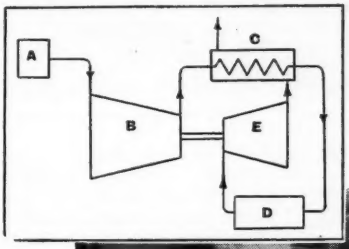
Those with a little leisure at the week-end may like to puzzle out the meaning of the following passage from the script of a recent lecture :—

"If ever, perhaps in the offices of some independent wire manufacturer, any sense of urgency found voice, there came simultaneously tidings of good profit earned elsewhere where the production of ferrous wires found financial federation with the drawing of non-ferrous metals or with the making of ropes or netting or other diverse activity." —**REFLECTOR.**

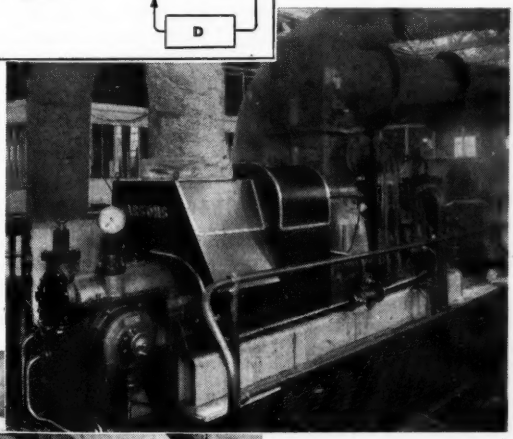
British Gas Turbine

Installation at Parsons Works

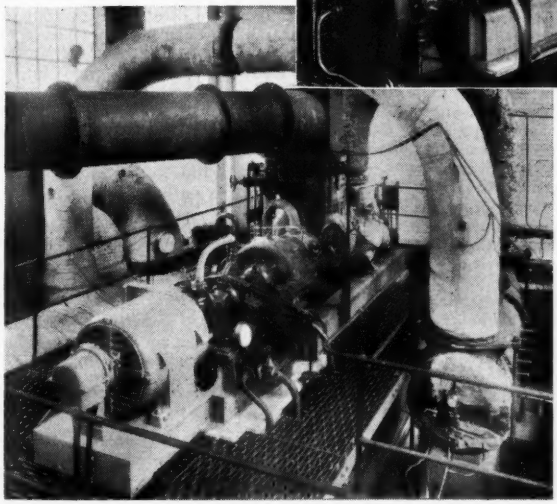
SHORTLY before the war in consequence of developments in heat resisting alloys C. A. Parsons & Co., Ltd., who had for many years considered the possibilities of the internal-combustion turbine, acting in collaboration with the Parsons Marine Steam Turbine Co., put in hand an experimental unit rated at 500 B.H.P. (net output) at 6,000 r.p.m. This capacity was chosen as the smallest which would provide reliable operating data. For this development Parsons were favourably placed not only from sixty years' experience in building turbines but also as the originators of the axial-flow compressor at the beginning of the century. High efficiency in the latter component is essential as otherwise too great a proportion of turbine power is expended in compressing the air for the operating cycle. The unit which is described in this article is the prototype of a number of commercial projects which are now under consideration. Construction was started in 1938 but was hindered by war conditions. It was found, however, that this delay had advantages, as it enabled use to be made of data which had been obtained from the performance of jet-propelled aeroplanes. The plant has been undergoing almost continuous running tests at the works during the last six months.



Operating cycle of gas turbine



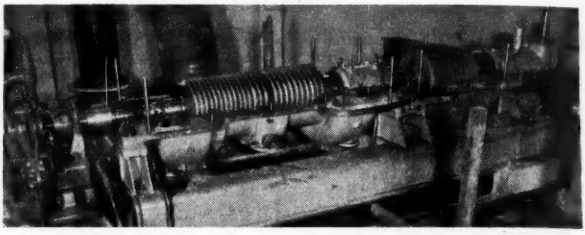
View of unit from turbine end



Below: Lay-out of complete plant; the regenerator is at the back, below floor level; the combustion chamber is on the other side, also below floor level

The method of operation of the plant is illustrated. Air is drawn into the system through the

filter A by means of the axial compressor B, which delivers it at about 50 lb per sq in. to the regenerator C. Here it takes up waste heat from the exhaust gases of the turbine before passing to the combustion chamber D. Into the latter "pool" fuel oil is sprayed through an atomizing nozzle and burned by part of the incoming air. The remainder of the air is diverted so as to cool the inside of the combustion - chamber walls before mixing with the products of combustion at the outlet of the chamber. The resulting high-temperature gases are taken directly to the turbine E, which is direct-coupled to the compressor and the net available power, in the experimental plant, is absorbed by a Froude dynamometer on the same bedplate, enabling useful output to be measured under all operating conditions.



Turbine and compressor under erection

Speed is normally controlled by throttling the fuel supply to the combustion chamber. An emergency stop valve mounted on the turbine shuts down the set by by-passing the turbine if tripped by the over-speed governor at the end of the shaft. On starting, the plant is run up to half speed by an electric motor, after which fuel is turned on and ignited by a low-voltage plug and on full speed being reached, an automatic clutch disconnects the motor. The auxiliaries are independently driven lubricating and fuel-oil pumps.

Placing Underground Services

Recommendations of a Joint Committee

THE Committee appointed jointly by the Institution of Civil Engineers with other professional bodies and several Ministries has now reported on the "Location of Underground Services." Its chief recommendations are that mains should be laid in the following order from the highway boundary to the kerb line:—Nearest the boundary electricity, then gas, then water, and nearest to the kerb telecommunications. In general a width of not less than 10 ft 6 in. on both sides of the street will permit orderly disposition, but it is possible in new estates or less densely developed areas in existing towns to keep the services within a width of 6 ft; this limits the space available for repairs and also makes it necessary to lay communication pipes across the street when only one main is laid. For district heating it is considered that a conduit beneath the verge or carriage-way will be necessary.

The positions of transmission and trunk mains which are likely to be laid in only a small proportion of streets (not always main streets) should be decided locally when the needs are first foreseen. Mains over bridges should, so far as is practicable, be accommodated in pipe bays under the footways. Subways should be confined to crossings under the carriageway at major traffic intersections, except in very special circumstances. Sewers cannot be made to conform to rules of location.

The planting of kerbside trees in town streets, except perhaps in quiet residential areas or culs-de-sac, should be discontinued unless wide verges can be provided. Often improved effects can be obtained by planting shrubs instead of trees. The importance of co-ordination is stressed; generally this can best be achieved by utilizing the services of the engineer to the appropriate highway authority.

Copies of the report are obtainable from the Institution of Civil Engineers, Great George Street, Westminster, S.W.1, price 6d. (including postage).

British Lift Practice

A BOOK entitled "Lifts," which is likely to be most valuable to anyone concerned in their design or installation, has been published by Marryat & Scott, Ltd., 40, Hatton Garden, London, E.C.1. The work is available on application by practising architects, surveyors and consulting engineers. In its 223 pages, the author, Mr. L. W. Honey, has brought together the legislative requirements relating to the subject together with extracts from Departmental reports, Codes of Practice, B.S. and I.E.E. Regulations as well as a number of technical tables. One section sets out the declared voltages in use in the areas of different supply undertakings. Numerous diagrams illustrate the duties of lifts and methods of installation recommended.

Electric Strain Gauges

Principles of Operation

By A. Barwood White, B.Sc., A.M.I.E.E.

RESEARCH work and routine tests on stressed components of machines and structures often involve the measurement of surface strains. The electrical way of determining such strains, although a fairly recent development, is now in wide use.

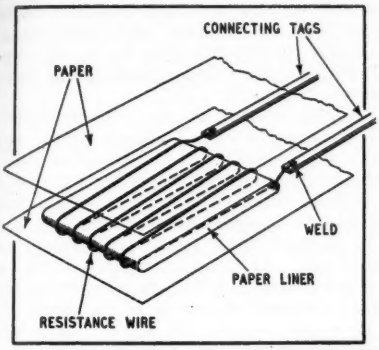


Fig. 1.—Resistance strain gauge element before flattening and bonding

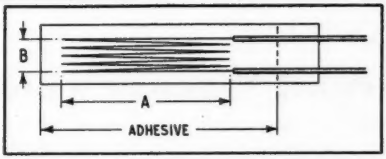


Fig. 2.—Proportional representation of gauge element (A = length, B = width)

The electric strain gauge depends on the fact that a wire, when extended or compressed within its elastic limit, undergoes a change of resistance in definite proportion to its change of length. Thus, if the wire is firmly attached to, but insulated from, the surface under test then the change of resistance will be a measure of the strain experienced.

A single length of wire would have too low a resistance for convenient measurement. The gauge is therefore made up of a narrow zig-zag, or flattened, coil of Eureka or nickel-chrome wire (Figs. 1 and 2) laid between sheets of thin paper and the whole is impregnated and bonded. Connecting tags are spot-welded to the ends of the resistance wire and embedded in the paper to prevent drag. The gauge length is normally from $\frac{1}{4}$ in. (or even less) to 2 in. and the resistance ranges from 120 to 2,500 ohms, according to the duty of the gauge. There are also multiple gauges comprising two or more single gauges placed at an angle to one another (Fig. 3) and used for measuring compound strains, or for determining their orientation. Such gauges are of negligible bulk and inertia, and can be connected up through flexible leads to a remotely placed measuring instrument.

Attachment to the test surface must be exceedingly firm and has been the subject of much research. Various glues and cements are used, their value depending on their strength, simplicity of application and speed of drying. A " self adhesive " gauge (patent applied for) lately developed by the British Thermostat Co., Ltd., is ready-coated with adhesive and needs only to be dipped into acetone, pressed firmly on to the test surface and allowed to dry. Application is quick and simple, a matter of some importance, for example, when testing an aeroplane structure, which may require several hundred gauges. The same firm produces a resin-treated strain gauge for use at elevated temperatures. It adheres firmly after application under heat and pressure.

According to the kind of alloy wire used

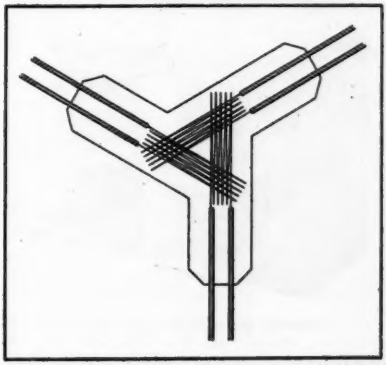


Fig. 3.—Delta configuration gauge; included angles = 60 deg

strain gauges have a " sensitivity factor " generally of 2·00 or 2·25, which means that change of resistance is approximately twice the strain. Thus, with a tensile strain of 0·1 per cent (a typical value) the resistance of a 1,000-ohm gauge may increase to 1,002·5 ohms. It will be realized that the measuring apparatus must be of high accuracy; also, steps must be taken to minimize leakage currents and to compensate for temperature changes.

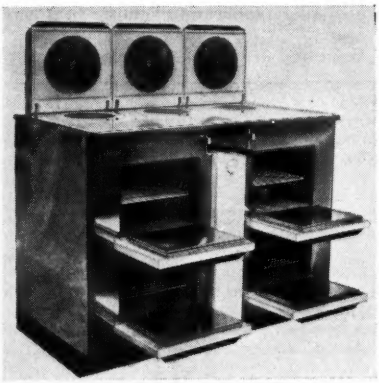
So-called " static " strains are those which can be relied upon not to vary during the taking of readings, say for upward of one minute. The measuring apparatus in such cases generally consists of a slide wire bridge with a mirror galvanometer. To compensate for temperature changes one arm of the bridge is formed of a second, or " compensating," gauge which is mounted close to the main gauge and subject to identical thermal conditions, but free from strain. A balancing potentiometer is provided to bring the galvanometer deflection to zero before the strain is applied. When multiple instruments are used for reading a number of gauges in succession a selector switch is fitted and, in addition, a separate potentiometer is provided for each main gauge. Both null and deflectional methods of reading are employed.

Most " dynamic " strains of any waveform or frequency up to the highest likely to occur in engineering practice can be measured, or recorded, with the aid of a cathode-ray oscillograph and valve amplifier. In some cases a difficulty arises because an ordinary transformer-coupled valve amplifier will not magnify very low frequency current without distortion; even a direct resistance-coupled amplifier may be found to be insufficiently stable owing to resistance-temperature variations.

A solution which has been evolved consists in "chopping" the gauge signal at a frequency considerably higher than the strain frequency. The resulting current pulses are fed into a transformer-coupled amplifier, which can readily be designed to ensure a constant amplification factor at the pulse frequency concerned. Each pulse produces a dot on the screen and, provided the pulse frequency is high enough in relation to the frequency and waveform of the signal, the result is an undistorted and practically continuous curve.

Thermal Storage Cooker

A NEW design of thermal storage cooker made by the Sterling Engineering Co., Ltd., incorporates four ovens of different temperatures, " Fast " for roasting ; " Moderate " for baking and casserole cooking; " Slow " for slow cooking, milk puddings, fruit bottling and simmering; and " Cool " for " haybox cooking," milk pasteurization and for use as plate-warming cupboard, etc. Similarly, a " Fast " hot-plate provides ultra-rapid boiling (5 pints in 5 minutes), a " Medium " hot-plate gives boiling at about half this speed, while simmering is catered for on a third plate.



Sterling thermal storage cooker

All switching and manipulation of thermostats, etc., are thereby eliminated. The grill, which has a radiant sheathed rod type element, is arranged to give instantly adjustable control of temperature and distance of the grill rack from the element. The grill pan and rack are of stainless steel.

The apparatus has a maximum loading of only 2 kW, with a high load factor, great reliability, immunity to voltage variations and temporary failures of supply. The dimensions are 46 in. wide, 26 in. deep and 36 in. high. Drop-down oven doors have torsion bar hinge rod counterbalance, eliminating extraneous springs.

Specially designed handle grips, accessibility from the front to the heating elements, incorrodible materials throughout, a sealed top preventing the percolations of drips into the interior, removable grill enclosure and oven supports, easily cleaned surfaces and a stainless metal hob are other noteworthy features of the new cooker.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Variable-Speed Motors

IN the article by "Rotor" in your issue of July 12th, Fig. 2 gives the connection for a two-speed (pole-changing) motor for constant-torque output as parallel-star for the high speed (H.S.) and series-star for the low speed (L.S.), while Fig. 3 gives the connection for a constant horse-power motor as parallel-star (H.S.) and series-star (L.S.).

TABLE 1
Coil Pitch = 90 electrical deg (H.S.) or 180 electrical deg (L.S.)

HIGH SPEED	Connection	Parallel star	Parallel star	Series delta
	Relative flux	148	256	111
LOW SPEED	Connection	Series delta	Series star	Parallel star
	Relative flux	100	100	100

TABLE 2
Coil Pitch = 120 electrical deg (H.S.) or 240 electrical deg (L.S.)

HIGH SPEED	Connection	Parallel star	Parallel star	Series delta
	Relative flux	105	180	78
LOW SPEED	Connection	Series delta	Series star	Parallel star
	Relative flux	100	100	100

Although these connections are quite feasible, other connections are frequently employed. The choice of the connection for any specific duty is influenced by the pitch of the stator coils, as this determines the ratio of the fluxes for any given connection.

For example, the accompanying tables give the approximate relation of the flux per pole (H.S.) to the flux per pole (L.S.) when the coil pitch is 90 electrical degrees (H.S.) or 180 electrical degrees (L.S.) and when the coil pitch is 120 electrical degrees (H.S.) or 240 electrical degrees (L.S.) respectively.

From the above tables and from the text of the article (p. 55) it would appear that Figs. 2 and 3 refer to motors having a coil pitch of 120 electrical degrees (H.S.) or 240 electrical degrees (L.S.). In practice, a coil pitch corresponding to Table 1, is very frequently employed together with the parallel-star (H.S.) series-delta (L.S.) connection for a constant-torque motor and the series-delta (H.S.) parallel-star (L.S.) connection for a constant horse-power motor. These connections are different from those given in Figs. 2 and 3, in that in Fig. 2 the low-speed connection is changed from star to delta and in Fig. 3 the connections are interchanged. The smaller coil pitch has the advantage that it gives less weight of copper and smaller copper losses in the stator winding.

From the lower part of Fig. 1 (which presumably represents the distribution of flux density round the stator periphery at a particular instant) one might suppose that, on the larger number of poles, the curve of flux density was anything but a sine-wave, as it contains pronounced even harmonics. In an induction motor with a regular stator winding, the presence of even harmonics in the flux wave is not possible. Furthermore, in a motor of this type, the distribution of flux density is a closer approximation to a sine-wave on the larger number of poles than on the smaller.

Gateshead. J. W. HIBBERT, A.M.I.E.E.

Unsafe Installations

THERE is not the least doubt that the duty of ensuring that installations are properly carried out and maintained falls primarily on the contractors' organizations and is not at all a duty of the supply authorities. It may be that supply authorities are in the best possible position in the matter of "sanctions" to be applied against the owner of an unsafe installation, but there is no legal or implied duty to apply them unless the installation has a low insulation resistance or is likely to interfere with the supply to other consumers. In fact they *must* give supply unless the above conditions are found.

I would go so far as to say that the supply authority should not inspect installations at all, but that it should be compulsory for every contractor to supply the authority and the consumer with a certificate in a prescribed form, stating that the installation complies with the I.E.E. Regulations. Not only this, but subsequent inspections should be made

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by an official of the E.C.A. or similar body, and a report given to the supply authority, to the effect that an installation is defective, should be equivalent to an order to disconnect the offender. If non-members of the E.C.A. were required to pay an inspection fee to the Association for the services of the inspector, who alone had power to issue certificates, it would not be long before we heard the last of amateur wiremen.

It is most unfair to place the onus of inspection on supply people who have no financial interest in the work. On the other hand it is quite fair that the consumer should pay his own inspection fee as part of the price of the job and not saddle all other consumers with this expense.

In effect, at present, the perpetrator of an installation which is rejected by the supply authority and which is never connected, gets off scot-free, at the expense of the law-abiding consumers who must pay the authority to maintain its inspectors !

Sheffield. D. H. BRAID.

Training Colliery Electricians

FROM past experience I can endorse every word of your correspondent " Colliery Electrician " (*Electrical Review*, July 26th).

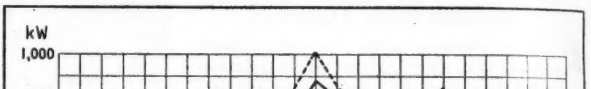
Why are colliery electricians in general looked upon and treated as nonentities, not only by certain sections of the mining industry but by many outside engineers, who have only the slightest idea, and this very often erroneous, as to the many and varied duties of these men ? As an ex-colliery electrician, who is still very interested in this branch of mining, I feel confident that unless colliery electricians are treated as highly skilled and competent men worthy of official status and recognition then not only will the output rate decrease but the accident rate will increase.

M.A.M.E. and M.E.

Temperature and Distributor Loading

YOUR readers may be interested in the attached chart which has been prepared by the distribution staff from records taken on this undertaking.

The two dates referred to are July 9th and 16th. The first was an exceptionally hot day, whereas the temperature on July 16th was 1 deg F less than it was on January 11th. So far as is known all other conditions were equal. The kWh recorded per shift, viz. midnight to 08.00, 08.00 to 16.00 and 16.00 to midnight with the corresponding tempera-



Loading on two days with widely-differing temperatures

tures were for July 9th: 25,600, 60 deg, 55,500, 75 deg; 41,200, 67 deg. For July 16th they were 25,000, 54 deg; 63,200; 58 deg; 49,500, 52 deg. E. A. LOGAN,

Erith. *Borough Electrical Engineer.*

Engineering Calculations

IN calculation of force, the product of mass and acceleration must be divided by " g " to obtain the answer in practical units. The formula is usually written $F = \left(\frac{W}{g}\right) . f$ where F = force in lb, W = mass in lb, f = acceleration in ft per sec per sec and g = 32·2 (acceleration due to gravity). This introduces a new unit of mass, $\left(\frac{W}{g}\right)$, sometimes known as the " slug ". This ingenious idea, almost universally adopted in technical colleges, has proved to be very practical and conducive to accuracy.

As an example of its use, take the problem of finding the force required to lift a mass of 1,000 lb with an acceleration of 10 ft per sec per sec: $F = 1{,}000 + \left(\frac{1{,}000}{32{\cdot}2}\right) \times 10$ = dead weight + slugs × acceleration. A junior student may ask, " Why divide by g in the second term and not in the first ? " The answer is the mass is expressed in slugs only when the kinetic force or kinetic energy formula is used.

The idea of automatic division by " g " opens up two alternative methods, as time and space are also concerned. In the first alternative a new time unit, p, is used such that $p = t\sqrt{g}$, the " tick." Note that as $\sqrt{g} = 5{\cdot}68$, the subdivision of the second is

quite practical, there being 340 ticks in one minute. A force of 1 lb gives to a mass of 1 lb an acceleration of one ft per tick per tick. The example then becomes $F = 1{,}000 + \left(\frac{10}{\sqrt{g}}\right)^2 . 1{,}000$ = dead weight in lb and mass in lb × acceleration in ft per tick per tick.

There is now no possibility of confusions over mass and weight. A worse possible cause of confusion remains, however, as we have two units of time. In the case of finding Power = Force × Velocity, it would not be satisfactory to employ velocity in "ft per tick" units. As before it would apply in some cases but not in others. On balance the method has little to recommend it.

In the second alternative a new unit of space is chosen, the span = 32·2 ft or 981 cm. Note that measurements are directly practicable, by measuring length in cm adding 2 per cent and shifting the decimal place three places to the left. For instance a pencil 10 cm long would measure $\left(10 + \frac{2}{100}10\right) \frac{}{1{,}000} = 0{\cdot}0102$ spans. A force of 1 lb would give to a mass of 1 lb an acceleration of 1 span per sec per sec. The above example would now be written $F = 1{,}000 + \frac{10}{32{\cdot}2} 1{,}000$ or $1{,}000 \left(1 + \frac{10}{32{\cdot}2}\right)$ Force in lb = dead weight in lb + mass in lb × acceleration in spans per sec per sec.

We can see at a glance how dead weight has increased by a factor obtained by adding unity to the acceleration in spans per sec per sec. This method is almost fool-proof and has eliminated the confusions of mass and weight or seconds and ticks.

East Ham Technical College. D. G. SANDEMAN.

Electrical Advice for Farmers

WHAT is believed to be the first permanent electrical stand to be established in a market place has just been opened by Central Sussex Electricity, Ltd., at Haywards Heath. Occupying an excellent position right in the centre of activities, the display will be open every market-day (about seventy times a year) to give advice to farmers on electrical matters. Among the items specially displayed are steam-raising plant; an under-draining-board dual-purpose water heater, which is being used with great success in dairies; pumps; general-purpose motors; incubating and brooding appliances; an "Essex" mill; tubular heaters; various types of lighting fittings including fluorescent tubes, for cow byres, dairies, etc.; an exhaust fan; an electric fence unit; and a grain moisture meter. The installation on the stand is carried out throughout with special farm wiring in order to show its various applications, and to make farmers "earth-leakage conscious" a demonstration unit has been built up incorporating an earth-leakage trip.

The confined space does not permit working demonstrations of the larger appliances and in any case Mr. P. H. N. Turner, the sales manager, who is in charge of the stand, says that it is much more satisfactory to take farmers to see apparatus actually in service on one of the neighbouring farms. Some of these installations are illustrated by photographs on wall panels. Inquiries regarding availability of supplies, etc., can be promptly settled by reference to maps and records on the spot, and a good selection of current trade literature is available. This latest extension of the facilities which Mr. H. Dixon, engineer and manager of the company, has provided for the benefit of the farming community follows closely on the introduction of an attractive farming tariff.

The Central Sussex Co.'s display at Haywards Heath market place

Nationalization Proposals

Exchanges Between Minister and Companies

IT will be recalled that in June the Minister of Fuel and Power met representatives of the various sections of the electricity supply industry to discuss with them his proposals for the nationalization of the industry. At their particular meeting the representatives of the companies made it clear to the Minister that he could not expect them to acquiesce in their extinction.

We have now received from the companies copies of letters which have passed between Sir Donald Fergusson, Permanent Secretary of the Ministry of Fuel and Power, and the Incorporated Association of Electric Power Companies, the Provincial Electric Supply Association and the London Electricity Supply Association.

Suggested Appointment of Committee

In the course of a letter dated June 27th Sir Donald Fergusson said:—

"The Minister fully understands that the policy of your Association is to oppose the Government's policy to nationalize the industry but he assumed that, both in the national interest and in the future interests of the electricity industry and its employees, they would be willing to put at his disposal their considerable experience of the industry.

"The discussion on the 20th June has made the Minister very doubtful whether your Association are prepared to assist him in the manner that he had anticipated, and I am accordingly directed to ask you to say definitely whether or not they are prepared in the national interest to give him the benefit of their advice and experience in framing the proposals for the forthcoming Bill. If the Association should see their way to assist the Minister in this manner I am to suggest that the best method to be adopted would be for them to select a small committee of persons with an expert knowledge of the electricity supply industry whom the Minister could consult. In other words they would not be regarded as representatives who were reluctant to express any views unless they had been endorsed by the majority of the members of your Association. . . . It would, of course, be understood that the views expressed by these persons did not commit the Associations by whom they were nominated."

Power Companies Decline

In a reply to this, dated July 23rd, the secretary of the Power Companies' Association (Mr. J. A. MacKerrell) says that his Association

"have at all times been and are now ready and willing to co-operate and give the benefit of their wide experience in such work of organization and co-ordination of the industry as will be 'in the national interest and in the future interests of the electricity industry and its employees'; but they are thoroughly convinced that to nationalize the industry by transferring it to Government ownership is contrary to each and all of these named interests. As you state that the Minister fully understands that they are opposed to this Government policy, they do not appreciate the grounds the Minister has for his 'belief' that they were anxious to be consulted as to 'the best means of carrying out the Government's intention to nationalize the industry'.

"My Association feel that to elect a committee such as you suggest to assist in framing proposals would give rise to misconceptions as to the position and attitude of those taking part in the consultations and they cannot reasonably be asked to adopt such a suggestion.

"No case for nationalization has so far been disclosed and in any event the policy has yet to be debated in Parliament and subjected to public criticism. I am therefore instructed to suggest that the proper procedure would be for the Government to disclose their proposals and show the grounds on which it is claimed that their policy is in the national interest and in the interests of the industry before inviting us to confer with them."

Imports into Turkey

THE *Board of Trade Journal* (July 20th) publishes lists of goods for which Turkish import permits will be granted; they supersede previous lists. For items marked with an asterisk importation has been temporarily suspended because the quota allowed by the Ministry of Commerce has been revised. The following electrical classes are included in the lists:—Accumulator separators; mica in slabs or sheets; insulators of all kinds; incandescent lamps (electric bulbs); incandescent bulbs for Röntgen apparatus; heating radiators and parts thereof*; hygienic articles (such as electric cushions, etc.); microphones of 10 V or more; telegraph and telephone apparatus; wireless receiving sets and transmitters and their parts (apart from radio sets); Röntgen apparatus and other electrical instruments used by the medical and veterinary professions and parts thereof; electric motors (except ordinary fans)*; accumulators and batteries*; electrodes and brushes; and tramcars.

Current quotas have been filled in the cases of porcelain insulators; electric bulbs (220 and 110 V); radiators and parts thereof; copper electric wire, bell wire, etc., submarine cables, telephone lines; hot water boilers and central heating boilers; commutators; and batteries for pocket lamps.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE British Electrical and Allied Industries Research Association announces the following appointments to the recently advertised positions of heads of departments :—

Mr. C. G. Garton has been appointed head of the department relating to materials (particularly dielectrics). Mr. Garton was educated in Weston, Canada. He received his technical training in this country with the British Thomson-Houston Co., 1917-1921 and joined the

Mr. C. G. Garton

Mr. L. Gosland

company's engineering staff in 1921. He transferred to the research staff in 1924 and in 1933 he went to the All-Union Electrotechnical Institute, Moscow (the central research institute of the Electrical Trust of the Commissariat of Heavy Industries), where he was engaged until 1937 on research in dielectrics. He returned to this country in 1937 to join the staff of E.R.A., and continued with researches in the same field. Mr. Garton is an associate member of the Institution of Electrical Engineers and a Fellow of the Institute of Physics, and is the author of publications on the theory of dielectrics which have appeared in the *I.E.E. Journal* and the *Transactions* of the Faraday Society.

Mr. L. Gosland has been appointed head of the department relating to electrical installations. He received his technical education at Glasgow University, graduating B.Sc. in engineering in 1924. After post-graduate work, he joined the staff of E.R.A. in 1925, being first engaged in switchgear research at the Carville power station. He is now a senior technical assistant in the Association's switchgear department. Apart from work in the E.R.A. laboratories at Perivale, Mr. Gosland has been responsible for the arrangement of much of the Association's full-scale field work in problems associated with switching. He is a member of the Institution of Electrical Engineers and has contributed several papers to the *I.E.E. Journal* and elsewhere, mainly on restriking voltage characteristics of networks.

At the monthly luncheon of the Batti Wallahs' Society on July 25th, **Admiral of the Fleet the Earl of Cork and Orrery** was the principal guest and addressed a good gathering of Batti Wallahs on the subject of the need for a naval reserve to be built up as a self-contained unit to be called upon in emergency. He stressed the need for such an auxiliary force and for volunteers with technical experience to feed it. The toast of the speaker was ably proposed by **Mr. J. W. Perkins.** No luncheon has been arranged for August; the next one will take place in September. The hon. secretary, Mr. M. Whitgift reported no addition to membership during the war years.

Mr. E. W. Faithfull, A.M.I.E.E., whose appointment as borough electrical engineer and manager at Aberystwyth has now been confirmed by the Borough Council, was educated at Peter Symonds Secondary School, Winchester, and received his technical training at the University College, Southampton. In December, 1924, he joined the Seaton & District Electric Light Co., Ltd., as assistant engineer, and in February, 1932, went to Bridport to take up the position of assistant mains engineer with the Corporation Electricity Department, being promoted three years later to consumers' engineer. He left Bridport in 1941 to become power sales engineer with the High Wycombe Corporation Electricity Department, a position which he is now vacating to go to Aberystwyth.

The annual sports and gala meeting of the Johnson & Phillips Sports Club was held on July 13th at the Kidbrooke Sports Ground, after six years' interruption occasioned by the war.

Mrs. G. L. Wates, wife of the chairman and managing director, presenting the prizes at the J. & P. Sports

Approximately 2,500 attended to watch competitors in 39 events make the best of the good weather conditions. Prize winners were evenly

distributed throughout the company's departments, the tug-o'-war, men's relay, and ladies' relay races proving great attractions, with boiler house, garage, and employment departments as respective winners. Presentation of the prizes was made by Mrs. G. Leslie Wates, wife of the chairman and managing director. Among the side shows, two excellent model trains were in demand all the afternoon giving rides to the children, and in the evening there was dancing on the green.

Mr. C. W. Goyder, C.B.E., chief engineer, All India Radio, Government of India, relinquished his appointment in India on July 15th, and is returning to England via Australia and North America. Mr. Goyder was appointed the first chief engineer (broadcasting) to the Government of India in 1936 to start a broadcasting system for British India. **Mr. B. V. Baliga,** who was previously assistant chief engineer, has succeeded Mr. Goyder.

Mr. C. W. Goyder

Newey & Eyre, Ltd., Birmingham, announce the following elections to their board: **Mr. F. Vincent Everard,** M.I.Mech.E., as chairman, **Mr. Charles M. Field** and **Mr. George H. Bicknell.** Mr. Everard is a director of Bellis & Morcom, Ltd. The other two gentlemen have been connected with Newey & Eyre, Ltd., for many years.

Mr. T. Makemson, Director of Iron Castings in the Iron and Steel Control, is being released by the Ministry of Supply, and is returning to his post as secretary of the Institute of British Foundrymen. He will, however, continue to act as honorary adviser on iron castings to the Ministry.

At a recent dinner given by the directors of the Merthyr Electric Traction & Lighting Co., Ltd., a gold wrist watch was presented to **Mr. L. W. Dixon,** who has retired from the position of managing engineer to the company after thirty-nine years' service. Mr. Dixon thanked the chairman and directors for making the presentation dinner possible, and the employees for their co-operation.

Air Vice-Marshal R. S. Aitken, C.B., C.B.E., M.C., A.F.C., and U.S. Legion of Merit, vice-president of the British Institute of Radio Engineers, has been appointed to the board of Radio and Television Trust, Ltd., as a full-time director. In his new post he will be occupied with general administrative matters for the group of companies which consists of the Philco Radio & Television Corporation of Gt. Britain, Ltd., Airmec, Ltd., Airmec International Sales, Ltd., P.R.T. Laboratories, Ltd., the Britannic Electric Cable & Construction Co., Ltd., British Mechanical Productions, Ltd., the General Accessories Co., Ltd., and the Hopkinson Motors & Electric Co., Ltd. **Mr. B. Hallows Garside,** M.I.E.E., has also been appointed to the board of Radio & Television Trust, Ltd. He is managing director of the Hopkinson Motors & Electric Co., Ltd., and the Britannic Electric Cable & Construction Co., Ltd.

Mr. F. Twyman, F.Inst.P., F.R.S., has resigned his position as managing director of Adam Hilger, Ltd., which he has held since 1902, to become technical adviser to the company and to its associate, E. R. Watts & Son, Ltd., makers of surveying instruments. Mr. Twyman remains chairman of Hilger's. His place as managing director is taken by **Mr. G. A. Whipple,** M.A., M.I.E.E., F.Inst.P. Mr. Whipple, who is also managing director of E. R. Watts, is the son of **Mr. R. S. Whipple,** the chairman of the Cambridge Instrument Co., Ltd.

Mr. Twyman joined Hilger's in 1898, became manager on the death of Mr. Otto Hilger in 1902 and managing director of the company on its incorporation in 1904. Mr. Whipple, after graduating at Cambridge, carried out research work in Germany and in this country. He has served on the I.E.E. Council and has been hon. secretary of the Scientific Instrument Manufacturers' Association for the last six years.

The Brush Scholarship for 1946 has been awarded to **Miss Winifred June Willis,** who was educated at Loughborough High School and joined the Brush Electrical Engineering Co. as a student last September.

Brighton Town Council has increased the salary of the electrical engineer and manager, **Mr. H. Pryce-Jones,** to £2,500 per annum, rising by two annual increments of £250 to £3,000 per annum.

Mr. W. L. Williams, shift engineer with Cardiff Corporation Electricity Department, has been appointed deputy station superintendent at a salary of £666 per annum.

Mr. L. A. Lee, assistant consumers' engineer with the Mid-Lincolnshire Electric Supply Co., Ltd., has been appointed consumers' engineer with effect from August 1st. He was formerly with the Kettering Corporation Electricity Department.

Mr. J. L. Orchard, who has been employed by the Cambridge Instrument Co., Ltd., for twenty-seven years, formerly as assistant works manager of the Cambridge works, and latterly as resident engineer in the Manchester area, has retired from active work on reaching the age limit, and **Mr. A. W. Burrell,** who has for several years represented the company in the Home Counties, has been appointed resident engineer in the Manchester district. **Mr. H. J. Starling,** one of the company's London representatives, has been appointed resident engineer in the newly formed Nottinghamshire district

which covers the counties of Nottinghamshire, Cambridgeshire, Lincolnshire, Leicestershire, Northamptonshire, Rutland, Huntingdonshire, Norfolk and Suffolk.

Dr. H. J. van der Bijl, the well-known South African industrialist, who, among other things, is chairman of the South African Electricity Supply Commission and of the South African Iron and Steel Corporation, is at present in this country advising the Minister of Supply on the nationalization of the iron and steel industry. It is reported that he has declined to accept the chairmanship of the proposed Iron and Steel Board.

Messrs. H. W. Mitchell and **R. A. Bent** have been appointed to the board of British Electronic Products, Ltd. Mr. Mitchell has been chief of the industrial electronics section of the English Electric Co. and Mr. Bent has been in charge of the same company's electronic development laboratory. The other directors of British Electronic Products are Messrs. C. F. Jenvey and E. W. Jones who are also directors of the Woden Transformer Co.

Mr. J. W. Ridgeway has been re-elected chairman of the British Radio Valve Manufacturers' Association, and **Mr. G. A. Marriott** has been elected vice-chairman.

York Corporation Electricity Committee has appointed **Mr. D. Field,** of Northampton, as senior mains assistant at a salary of £437 per annum.

Appointments Vacant.—Among the vacant positions advertised in this issue are the following:—Chief electrical engineer and manager for Nottingham (£2,250); electrical engineer and manager for Chester (£1,323-£1,557); mains superintendent, Ipswich (£725-£765); works superintendent (£785-£821), etc., for N.W. Midlands J.E.A.; civil engineering assistant for Portsmouth (£521-£544); and consumers' engineer, Boston & District E.S. Co. (£450-£500).

Obituary

Mr. G. H. Scholes.—We regret to learn of the death of Mr. George H. Scholes, head of the accessories manufacturing company which bears his name.

Mr. H. H. Asbridge.—The death occurred on July 12th in his seventy-second year, of Mr. Harry H. Asbridge, M.B.E., M.I.Mech.E., a director of the Churchill Machine Tool Co., Ltd. Mr. Asbridge was an authority on precision grinding and the design of machine tools of all types for that purpose.

Mr. F. L. Otter.—We regret to record the death, on July 18th, of Mr. F. L. Otter, M.C., M.I.E.E. Mr. Otter was educated at Harrow and Oxford, afterwards receiving training in the Siemens Works at Stafford. During the 1914-18 war he served in the Rifle Brigade and was awarded the Military Cross. He was for a number of years on the staff of Merz & McLellan in London and South Africa, being principally engaged on railway electrification, after which he joined the Indian State Railways in charge of the electrified section of the Great Indian Peninsula Railway in and around Bombay. Since leaving India he had been on the staff of the Central Electricity Board.

Mr. Harry Frederick Clark, for the past sixteen years manager for T. Beadle & Co., Ltd., wholesale electrical dealers, Blackburn, died at Accrington on July 24th, at the age of fifty-three. He had been in ill health for some months. Before going to the Blackburn firm, he was manager for Palmer, Riley & Co., Ltd.

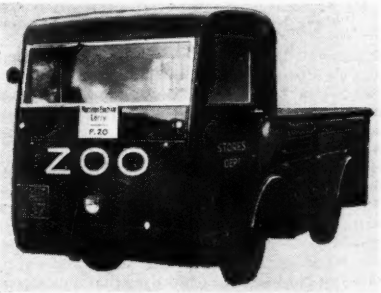
Mr. W. G. Crawford.—The death occurred on July 24th of Mr. William George Crawford, Scottish manager for Allen West & Co., Ltd. He had been associated with the company for sixteen years and was in his sixty-fourth year.

Wills.—Mr. William Dobson Watson, of Rochdale, Lancs, managing director of the Rochdale Electric Co., who died on March 18th last, left £14,497 gross, with net personalty of £14,329.

Mr. Leonard Owen Cox, of Leytonstone, Essex, formerly mains superintendent, Leyton Electricity Department, who died on March 1st last, left £1,897 gross (net personalty £1,868.)

Electric Vehicles in Transport Cavalcade

BATTERY vehicles were represented in the contemporary section of the London cavalcade of fifty years of transport, last

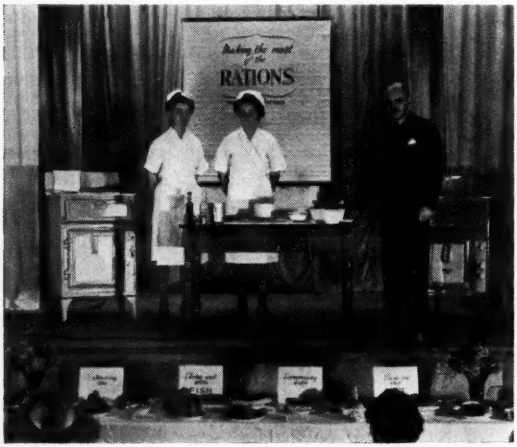


Crompton Parkinson "Morrison-Electricar" 20 cwt vehicle which took part in the cavalcade

Saturday, by five Crompton Parkinson "Morrison-Electricars." The entry comprised two milk delivery vans, 10 cwt and 20 cwt types, a 10 cwt baker's van, a 50 cwt lorry operated by wholesale druggists, and a 20 cwt flat deck vehicle which is to be used in the London Zoo for the internal transport of food to the animals, and for general utility purposes. This vehicle is to replace horse-drawn transport and has been adopted on account of its quiet, easy and economical running.

Catering Demonstration

ON July 23rd caterers in Erith and Bexley attended a demonstration and display in the Erith electricity showrooms given by the mobile demonstration team attached to the Public Relations Division of the Ministry of Food. The show, which was entitled " Making the Most of the Rations," was opened by Mr. E. A. Logan, vice-chairman of the Food Control Committee and borough electrical engineer. He was supported by Miss Armstrong, the food executive officer. Over eighty caterers attended, and as Erith is mainly an industrial area they came chiefly from factory canteens, though there was a fair sprinkling of people from schools, hospitals and youth organizations. Mrs. Pitkin, the supervisor of Erith's four British Restaurants, brought twelve cooks with her. One of these restaurants alone caters for 750 people a day and between them they deal with 10,000 children a week. Twenty-two dishes were on display showing useful methods of " stretching " the fat, meat, sugar and cheese ration. No ingredient was used that the caterers would find extravagant or in short supply, and only 1s. 4d. worth of meat was used in all the meat dishes.



Mr. E. A. Logan, borough electrical engineer at Erith, with two of the demonstrators at a recent catering demonstration

Stand-by Batteries in London

JUST before the war the London County Council was considering the revision of certain of its regulations governing the use of storage batteries for secondary lighting in places of public entertainment. The war held the matter up but now the Public Control Committee has recommended that certain changes shall be made.

It is stipulated in the existing regulations that a battery shall be capable of maintaining the full secondary lighting system for twelve consecutive hours without being charged while the load is on. There is a proviso that floating or trickle-charged batteries of a considerably lower capacity may be approved, subject to certain restrictions. The Committee recommends that floating or trickle-charged batteries, with suitable change-over gear, capable of maintaining full load for not less than three hours shall now be permitted. Such a battery shall be fully charged before the first admission of the public on any day and the load shall not be altered without the Council's consent. Other proposals are that a battery shall be under the supervision of a firm of competent accumulator makers who will test it at reasonable periods, and that any automatic switching devices for trickle-charged batteries shall be tested each day.

Commissioners' Consents

THE Electricity Commissioners have granted consent to the extension of the new Croydon power station by the installation of a 50,000-kW turbo-alternator, a 2,500-kW auxiliary alternator, and two 300,000 lb per hour boiler units, together with the construction of the necessary building and civil engineering works, and two cooling towers each having a capacity of 2·5 million gallons of water per hour. Sanction has also been given to the extension of the new Kingston station by the installation of two 30,000-kW turbo-alternator sets and three 260,000 lb per hour boiler units with ancillary plant and buildings.

The North Metropolitan Power Station Co. has been given permission to establish a new generating station at Rye House, Hoddesdon, comprising two 32,000-kW turbo-alternator sets, two 350,000 lb boilers, and a cooling tower with a capacity of 1,900,000 gallons of water per hour, with the necessary buildings and civil engineering works.

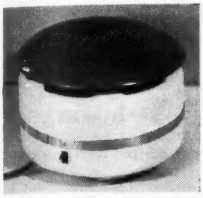
Among main transmission lines sanctioned are the West Kent Electricity Company's 33-kV underground line consisting of three 3-core 0·25 sq in. cables from Orpington Bye-Pass Road to West Street, Bromley; and the Metropolitan Electric Supply Company's 66-kV line consisting of three 0·4 sq in. conductors from the junction of Horn Lane with Western Avenue, North Acton, to Waterloo Road, Uxbridge.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Fan Convector

A ROOM heater of uncommon shape and interior arrangement is being marketed under the trade name of " Aerofier " by C. J. FOX & SONS, LTD., 117, Victoria Street, London, S.W.1. It contains a 2-kW heating element and distributor fan rotating horizontally. Air enters at ground level through a series of induction vents round the base while distributor vents beneath the top deflector plate help to fan out the heated air. The fan may be used alone as an air circulator without the heating effect.

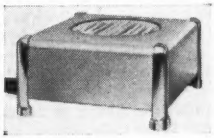


Totally enclosed fan-heater

Total enclosure and the absence of risk of scorching by contact, due to the low temperature of the casing, enable this heater to be placed anywhere in a living room and safely in proximity to flimsy materials in shops. It is finished in pastel colours and tests are claimed to have shown that, starting with an outside temperature of 55 deg. F, the temperature inside a room of 1,200 cu ft reached 65 deg. F after 35 minutes and after 100 minutes remained at 68 deg F with a difference of 3 deg F between floor and ceiling temperatures.

Boiling Ring

The moderately priced range of household devices introduced by HOSTESS APPLIANCES, Moxley Road, Bilston, Staffs., under the trade name of "Superlec" includes the "Junior" boiling ring of 1,000 W with an " open " element of relatively large surface area. It is finished in coloured enamel with chrome corner standards. There are also 1-kW reflector fires with a tubular frame enamelled in pastel shades or chromium plated.



An inexpensive boiling ring

Soldering and Welding Outfit

A universal outfit for soldering (up to 150 A at 70 V) and brazing as well as welding (from 18 s.w.g. to 0·5 in. thickness) in workshops is announced by the ACRU ELECTRIC TOOL MANUFACTURING CO., LTD., 123, Hyde Road, Ardwick, Manchester, 12.

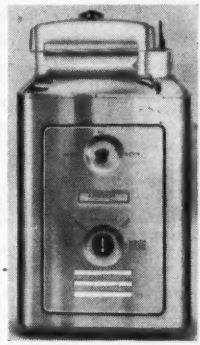
Energy is derived from the mains through a transformer in combination with an appropriate choke. Current and voltage are adjusted by two knobs with an ammeter mounted between them on the front of the cabinet. The electrode holder and earthing clip are plug-connected to sockets in each side of the casing.

Enclosed Reflector Fire

The " Conflector " produced by the ERALITE MANUFACTURING CO., LTD., 194, The Broadway, Wimbledon, London, S.W.19, is designed as a multiple-element reflector fire inset in a cabinet the front of which is closed by a heat-toughened plate-glass panel 0·25 in. thick. The glow thus remains visible while a convection effect is induced by air entering and leaving the cabinet through grilles below and above the glass front. A rotary 15-A single-pole switch in the base provides three-heat control (2,000-1,000-600 W), the lowest loading without reflection. A movable model and another which can be built into existing fireplaces are available.

Domestic Washing Machine

The blowing of air through the water to produce the physical action of boiling at low temperatures is the novel method of clothes washing employed in the new " Aerowash " machine being made by CLIFFORD AERO & AUTO, LTD., Spring Road, Hall Green, Birmingham. As it does not incorporate a mechanical agitator, there is no risk of damaging clothes, and it is claimed that the machine is particularly effective for woollen articles which would be spoilt by boiling.



" Aerowash " washing machine

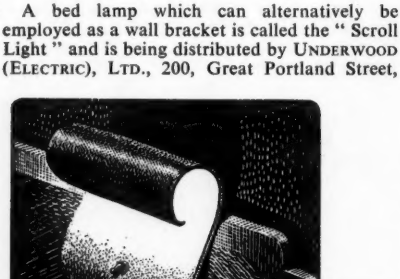
A 3-kW heater in the base of the tub is thermostatically controlled to give any desired water temperature, a large dial on the front having markings for " Boiling," " Whites," " Fast Colours," " Silks," " Woollens " and " Non-fast Colours." An illuminated grille indicates when the heater is in circuit. Above the heat-control knob is a change-over switch for the heater, the air blower and water pump for filling and emptying. A multi-port valve, operated by a lever at the side, controls the whole operation of the washer, its design permitting water to be drawn in and expelled through one hose without arresting or altering

the rotation of the pump and motor. The air blower delivers 12 cu ft of air a minute at a pressure of 10 lb per sq in. and the water pump 4 gal a minute.

A ½-H.P. capacitor motor with automatic cut-out and resetting device drives the blower and pump as well as the wringer, which is fitted with a fool-proof safety device. No lubrication is required. The washer will be available in three vitreous enamel finishes, peach and red, two-tone green and two-tone blue. Overall dimensions are 2 ft 10 in. high by 2 ft square. The inside of the tub measures 1 ft 3 in. cube and accommodates up to 10 lb of dry clothes. Castors are fitted to facilitate movement.

Clip-on Bed Lamp

A bed lamp which can alternatively be employed as a wall bracket is called the " Scroll Light " and is being distributed by UNDERWOOD (ELECTRIC), LTD., 200, Great Portland Street, London, W.1. It is a clip-on fitting named after its shape, a felt pad and rubber grummets preventing damage to the head of the bed. A keyhole slot is provided for fixing when used as a wall bracket. The scroll portion is made of metal, finished in old gold. A toggle switch is incorporated and a bayonet cap holder to accommodate a 15 or 25 W lamp.



Scroll-shaped bed-head lamp, showing clip-on attachment and alternative use (dotted) as a wall bracket

New Belling Products

Several new domestic electrical appliances will shortly be introduced by BELLING & CO., LTD., Bridge Works, Southbury Road, Enfield, who will notify dealers when they are available. A cooker for the National Housing Drive, available with either one of two hot-plates (types 46 and 47 respectively), possesses an attractive appearance finished in cream with a black top. With an oven capacity of 1 cu ft, the new " Baby Belling " cooker in the same colours is larger than its predecessors and has a 1,200-W bottom element (with or without thermostatic control) and a 2,000-W grill-boiler. An optional addition is a 2,000-W hot-plate, with " Simmerstat " if desired, for attachment to the side.

A new 1-kW fire for floor or wall use has a chromium-plated copper reflector and black and cream plastic sides and base. Three stoved cellulose finishes—silver, silver bronze and silver green—are available for the type 141 sheet-steel 1-kW model and the new streamlined 1- and 2-kW " Dinkie " units. In addition to a light-gauge sheet-steel " Electricoal " 3-kW reflector fire supplied in the same three finishes, there is a de luxe 3-kW model in two-tone stone or electroplated bronze, with chromium fittings. Easy wiring is a feature of two 1-kW panel fires for wall (type C.2) and corner (type 182) with sheet-metal surrounds finished in ripple bronze. Two 60-W lamps are used to warm a new towel rail.

Small-Oil-Content Circuit Breakers

The range of horizontal circuit breakers of the single-break, small-oil-content type developed by COOKE & FERGUSON, LTD., Victoria Street, Openshaw, Manchester, 11, has now been " proved " by short circuit tests up to 250 MVA at 11 kV carried out in Britain and up to 1,500 MVA at 44 kV in Sweden. This type of gear (*Electrical Review*, February 1st, 1946, p. 191) needs only 60 per cent (up to 250 MVA at 11 kV) and about 30 per cent (up to 1,000 MVA at 33 kV) of the oil required in conventional double-break types. It is comparable with orthodox types in respect of accessibility and convenience of maintenance while the replacement of contacts and arc-control devices is claimed to be halved. All sizes are in the high-speed (less than 0·1 second) category.

Amplifier with Automatic Monitor

The introduction of an amplifier under the trade name of " Philowatt " and rated at 1,000 W is announced by PHILIPS LAMPS, LTD., Century House, Shaftesbury Avenue, London, W.C.2, for large public address installations and wire broadcasting systems serving networks of 6,000 subscribers. A feature is the incorporation of " SAM " (built-in Scott automatic monitor) which electronically delays main high-voltage switching and facilitates unattended operation.

Absence of audio signals for a period exceeding three minutes causes a relay to be released, thereby injecting a small 50 c/s input to the amplifier which, if working satisfactorily, will thus be reset for a further three minutes. The duration of this switching signal is too short for it to be noticeable on the speakers served by the amplifier. Should the latter develop a fault, then the monitoring relay will not reset; instead an " earth " will be introduced into the circuit which may be arranged to operate an alarm or switch over to a stand-by amplifier.

COMMERCE and INDUSTRY

Draft Code for Refrigerators.

Domestic Refrigerators

A DRAFT British Standard Code of Practice, 3.6443, covering the installation of vapour-compression domestic electric refrigerators, has been circulated by the British Standards Institution for comment by August 12th. The chairman of the drafting panel of the committee convened by the Institution of Electrical Engineers is Mr. A. H. Young. A refrigerator of the type described can be transported without disconnection of parts containing refrigerant and has a net food-storage volume of not more than 25 cu ft maintained at an inside temperature of less than 46 deg F but not generally below 35 deg. Compliance with B.S. 922 is essential. Dimensions, motor horse-power, weights and rates of flow of water for three sizes are given. A dimensioned diagram of a standard inset unit is included.

Non-Ferrous Pipes

An addition to the series of British Standards relating to land boilers, B.S. No. 1306, Part 1, has been published at 2s. post free by the British Standards Institution. It covers non-ferrous pipes and piping installations and is on similar lines to B.S. 806 which deals with ferrous pipes. It prescribes limits of pressure and temperature for the use of copper pipes and bronze castings. Part 2, to be issued in the near future, will be concerned with seamless copper tubes with plain and screwed ends for steam services.

Power Engineers' Salaries

The National Joint Board of Employers and Members of Staff (Electricity Supply Industry) has notified its members that there is to be no change in the salaries of electrical power engineers for the current period (July 1st to December 31st). They will therefore remain adjusted to six points of addition, i.e., as shown in the schedule which operated from April 1st, 1946, and reproduced in the *Electrical Review* of April 26th.

Automatic Telephone Film

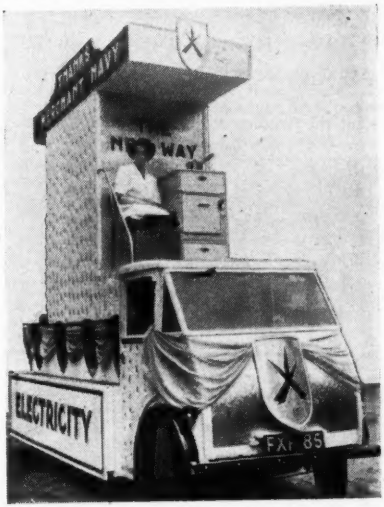
During the war years the Automatic Telephone & Electric Co., Ltd., with the assistance of the Air Ministry and R.A.F. produced a film depicting its principal activities. The results were shown in London last week. The film (" Where There's a Will "), which runs for about an hour and a half, is divided into distinct sections. First the company's normal work, the production of Strowger automatic telephone equipment is seen and then separate treatment is given to outstanding examples of the concern's war work —the direct-reading compass, the automatic pilot (" George ") and bomb dispersal gear. The final section deals with the making of wires and cables from the production of the copper to the finished job.

Ingenuity of design and production methods, superb craftsmanship and fascinating deftness are well brought out. The production and photography were by Mr. Leonard Card under the direction of Mr. R. A. Keir (the company's publicity manager) who also wrote and synchronized the sound commentary which is spoken by Mr. John Snagge. Copies of the film are available for loan to scientific film societies and similar bodies but the main idea is " sales promotion," particularly abroad.

Sulphur from Power Stations.

Hammersmith Merchant Navy Week

The Hammersmith Electricity Department supported the Mayor of Hammersmith's Merchant Navy Comforts Service Week by decorating its electric tower wagon and taking part in the procession. A demonstrator was



Hammersmith Electricity Department's contribution to the local Merchant Navy Week procession

shown with an electric cooker taking it easy, whilst an Ancient Briton was making heavy weather of cooking his fish over a log fire.

Power Station Emissions

Arising out of representations made to the Electricity Commissioners regarding the prevention of chimney emissions from the proposed Poplar power station and the Commissioners' reply, the L.C.C. Housing and Public Health Committee recommends that the Minister of Health shall be asked to set up an independent body (i) to inquire into the extent of the discharge into the air of sulphur and its compounds from installations such as electricity generating stations consuming large quantities of coal,

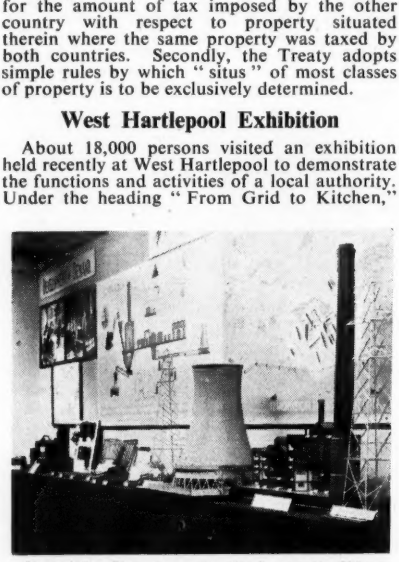
which would be injurious to health and in other ways ; and (ii) to determine and advise on the best measures which can be taken to extract this sulphur and its compounds. The Poplar Borough Council agrees with this proposal.

Anglo-American Taxation Agreement

The American Chamber of Commerce in London (Aldwych House, W.C.2) has published, at the price of 1s., an analysis by Mr. G. R. Sherriff (New York) of the provisions of the Anglo-American treaty to eliminate double taxation of incomes and estates. Two principal things have been accomplished by the Convention: First, credit has been established to avoid the effects of double taxation. This credit is in essence one allowed by the country of domicile (or citizenship in the case of the United States) for the amount of tax imposed by the other country with respect to property situated therein where the same property was taxed by both countries. Secondly, the Treaty adopts simple rules by which " situs " of most classes of property is to be exclusively determined.

West Hartlepool Exhibition

About 18,000 persons visited an exhibition held recently at West Hartlepool to demonstrate the functions and activities of a local authority. Under the heading " From Grid to Kitchen,"



Electricity Department's display at the West Hartlepool Local Government Exhibition

the electricity exhibit indicated the everyday activities of a supply undertaking. Mr. S. Tillotson, the borough electrical engineer, tells us that absence of propaganda in the way of prototype domestic appliances and the like in no way detracted from popular interest in the exhibit and the Home Secretary, Mr. Chuter Ede who opened the exhibition, spent some considerable time inspecting the display.

Mine Safety Device

A new invention for testing faults in electric cables in coal mines was demonstrated last week to representatives of the Trailing Cable Committee of the Ministry of Fuel and Power at Aberturret, Crieff. The inventor is Mr. P. K. Murray, a member of the outside staff of the B.B.C. in Scotland. The demonstration was attended by Mr. G. M. Harvey, H.M. Electrical Inspector of Mines for Britain and chairman of the Committee; Mr. A. Steele, Divisional Inspector of Mines for Scotland ; Prof. Stratham, head of the Mining Department at Sheffield University, and others. The Committee was set up by the Government after the Barnsley Main Colliery explosion in 1942 to look into the question of the safety of trailing cables. The instrument, it was stated, is capable of locating broken conductors or short circuits inside the cable which produce no marks on the surface.

Philips Eindhoven Works

Philips Incandescent Lamp Works at Eindhoven are now producing 80 per cent of the pre-war output, while the radio valve, incandescent lamp and X-ray departments are exceeding their daily pre-war production. The total number of workers employed at the plant is now 20,000, compared with 15,000 before the war.—*Reuter.*

Control of Civil Building

During the period between August 1st, 1946 and January 31st, 1947, the amount that can be spent without licence on building work on a property is restricted to £10. In addition, not more than £2 may be spent on any property in any calendar month in the period (on a non-cumulative basis). These financial limits are contained in the Control of Building Operations (No. 7) Order, 1946 (S.R. & O. 1946 No. 1150) which has been made by the Minister of Works, and are the same as those applicable during the six months ended July 31st.

Municipal Radio Set Sales

At a meeting of the Stoke Newington Borough Council last week the Electricity Committee reported on a meeting of representatives of local authorities held recently when the proposed sale of radio sets by local authorities was discussed. Fulham Borough Council had approached radio manufacturers who replied that they did not require any additions to their retailers, and refused to supply the Electricity Department. The Fulham Council subsequently made tentative arrangements for obtaining sets for re-sale, but wished to have the assistance of other Councils in order to make a success of the scheme.

Civil Service Commission Appointments

In last week's advertisement for posts at the Military College of Science, Shrivenham, the salary for the lecturer should have been given as £333-£560.

E.T.U. Annual Report

Membership of the Electrical Trades Union increased during 1945 from 132,484 to 133,033. There was naturally a fall (4,903) in the war emergency section and the female section was reduced by 699 to 3,016; the number of full benefit members rose by 2,741 to 67,555. The year's income (excluding political fund) was £244,288 and expenditure £165,451. The total amount of general funds at the close of the year was £713,701.

Details are given in the Executive Council's

report (signed by the general secretary, Mr. E. W. Bussey) of the results of wage negotiations in various branches of the industry. Dissatisfaction is expressed at the nature of awards made by the Industrial Court and the National Arbitration Tribunal.

In the course of his report, Mr. G. Cole, national organizer, emphasizes that increased leisure must be worked for by increased production. For this purpose he considers the retention or re-introduction of Joint Production Committees to be necessary.

U.S.-Italian Barter Agreement

The American General Electric Company has entered into a barter agreement with the Italian Government to take payment for large quantities of material which the company will ship to Italy, in the form of Italian plain silk piece goods. Joining in the barter deal are four other heavy industry manufacturers including the Westinghouse Electric Corporation.—*Reuter.*

Railway Charges

The Railway & Shipping Publishing Co., Ltd., 12, Cherry Street, Birmingham, 2, has published a revised "Scale of Standard Charges" (10s.) based on the increased railway charges of July 1st. This gives the current railway rates for all distances from 6 to 750 miles. In addition to the station-to-station rates, the collected or delivered rates and the collected and delivered rates are shown.

Visit to Cable Works

Members of the Welsh and Border Counties Branch of the Institution of Post Office Electrical Engineers visited the works of Aberdare Cables, Ltd., recently. The party was particularly interested in the stringent tests to which the cables were subjected in the Laboratory and Test Departments. Mr. J. Morgan, chairman, and Mr. J. R. Young, secretary of the branch, expressed the thanks of the visitors, and Mr. J. Wignall, works manager, replied.

Cambridge Engineering Society

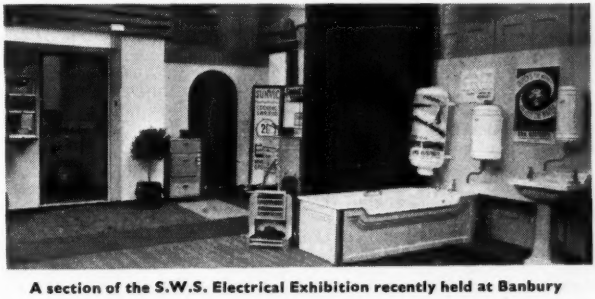
The Society commenced its summer activities with a visit to the Cambridge Engineering Laboratories. Demonstrations were given including insulator breakdown tests up to 70 kV, and metal testing. Instruments being made for special purposes were seen in the engineering workshop and instrument manufacturing shop.

Wiring of Houses at St. Helens

St. Helens Corporation Electricity Department on July 24th entertained about 25 local builders to luncheon and afterwards introduced them to some of the newest advances in lighting and heating technique. Demonstrators showed how, on the "ring" wiring system, an entire house could be fitted for electric light and heating by the incorporation of two simplified wiring circuits, one for the ground floor and the other for the upper floor. Mr. P. Bregazzi, the borough electrical engineer, said the Department was prepared to design the electrical installation and to draw up specifications for new houses, etc., and to ensure that the work was carried out efficiently and correctly.

S.W.S. Exhibition

An electrical exhibition, organized by the Shropshire, Worcestershire & Staffordshire Electric Power Co., was held recently at Banbury. The main feature of the exhibition was an all-electric unit-type kitchen, the fitments of which were made in separate units of standard size which ensure maximum adaptability. The lighting of the kitchen was by fluorescent discharge lighting and appliances installed included



A section of the S.W.S. Electrical Exhibition recently held at Banbury

an electric water heater and an electric washing machine. Other sections of the exhibition displayed domestic electrical appliances, including an electric water heater fitted over a bath, electric cookers, fires and vacuum cleaners.

Disposal of Surplus Machine Tools

An on-site sale of surplus machine tools will be opened by the Ministry of Supply at Rolls Royce, Ltd., L.M.S. Hangar, London Road, Derby, on August 14th and will close on August 20th. There will be approximately 300 machine tools available, including autos, capstan lathes, milling, grinding and drilling machines. The unsold machines will be on view for competitive tendering from August 21st to 27th.

An additional selling depot for Government owned surplus machine tools will be opened at the Ministry of Supply Depot, Theale, near Reading, Berks, on August 12th.

Electrical Facilities on Farms

A meeting of the county executive of the National Farmers' Union at Taunton deplored the lack of electrical facilities on farms. One delegate said the farms in his district were all wired but there was no hope of connection until Christmas, 1947. It was proposed to send a resolution to London, but the national delegate, Mr. F. Golledge, said they were only too well aware of the situation and the urgency of labour-saving light and power on the farms. The

consistently overworked farmer's wife needed this boon even more than the farmer. Mr. P. G. Tolson, the county secretary, said that invariably all electricity hold-ups were due to the great shortage of poles. It was not the fault of the companies.

Radio Engineering in Wartime

A profusely illustrated 48-page brochure entitled "G.E.C. Radio Engineering and the War Effort" summarizes in outline the diverse research, development and productive achievements of the General Electric Co., Ltd., in this branch of engineering which is by no means restricted to communication devices. Both the variety and quantities of products are impressive. For instance in one factory alone 75,000 soldered joints were made and inspected each day; in another case the test line output of a single piece of equipment (which was made up of 6,000 separate parts with 1,300 soldered joints and 21 valves) was maintained for a considerable period at one every eight minutes of each working day, although on every piece 139 inspectors checked some item for accuracy and testers made and recorded nearly 600 performance figures. Such mass production projects involved not only the devising of special operational equipment (even machine tools were designed and built by the G.E.C.) but also the recruitment and training of young men on a large scale.

"Closed Shop" Proposal

At a recent meeting the Wolverhampton Trades Council considered a proposal from the Electrical Trades Union that the Council should support a move to have the "closed shop" principle applied to the Corporation Electricity Department, i.e., that only members of trade unions should be employed. The Trades Council decided that as the principle was applicable to all Corporation departments a meeting of all the unions concerned should be convened.

Cavendish Laboratory Extension

A new wing to the Cavendish Laboratory, Cambridge, was opened on July 24th. It was built and equipped from a gift by Lord Austin of £250,000 after whom the wing is named. In the high-voltage section is a 2 million volt generator.

Annual Holidays

The works of the Morecambe Electrical Equipment Co., Ltd., will be closed from this evening until Monday, August 12th. A skeleton staff will deal with urgent matters, but no goods will be dispatched.

Mawdsleys, Ltd., will be closing their works at Dursley from August 2nd to 13th. A small staff will deal with urgent business.

Trade Publications

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.—Illustrated brochure technically describing centralized control of distant apparatus by ripple injection into the mains network.

Brush Electrical Engineering Co., Ltd., Loughborough.—Illustrated brochures dealing with (B.285) modernization of switchgear in factory power station; (B.219) cubicle switchboards for parallel running engine driven alternators, 3,000 A up to 660 V or 300 A up to 3,000 V; (B.218) vertical drawout switchgear up to 250 MVA at up to 12 kV; (B.217) round tank oil circuit breakers for 600 A up to 11 kV; (B.123) vertical isolation gear for 600 A at up to 11 kV; and (B.92) ring main gear for 300 A at 11 kV.

Applicants should write on their firms' business notepaper.

Trade Announcements

Johnson & Phillips, Ltd., have opened a new depot at the offices of James J. Hyde, Ltd., Belfast. All branch facilities are available, including the services of technical engineers, and stocks of rubber cables are held for immediate delivery. Stocks of junction boxes, B.N.E. domestic appliances, and other products will be created as soon as the manufacturing position permits. The branch is under the control of Mr. W. Reay, and the address is Johnson & Phillips, Ltd., 38, Bedford Street, Belfast (telephone: Belfast 21379.)

The Tube Investments Group announces that its traffic sign manufacturing subsidiary company, Gowshalls, Ltd., of Walsall, will shortly be moved to new premises at Oldbury, Birmingham, where a new production layout and additional plant are expected to result in a four-fold increase in output. The company will also undertake the manufacture of a number of additional accessories connected with traffic regulation and street lighting.

In addition to the warehouse already opened at Perry Road, Park Row, Bristol, Graham Farish, Ltd., have extended their Bristol premises to include trade showrooms and new offices.

Philimex, Ltd., has transferred its Electrical Department to Colonial Buildings, 59-61, Hatton Garden, London, E.C.1.

Mr. Oswald Hollmann informs us that he has re-established his business at 208, Kent House Road, Beckenham, Kent (telephone: Sydenham 5888), and that it is hoped to be in production with a new range of electric light fittings, table lamps and shades by the end of August.

TRADE MARKS

THE following applications have been made for trade marks. Objections may be entered within a month from July 24th:—

ASCO. No. 636,043, Class 9. Electric storage batteries, coils, condensers and contact points.—Fred Pitchford, trading as Accessories Supply Co., 32, Alexandra Road, Stockton Heath, Warrington.

ISOPAD. No. 640,285, Class 10. Electrically heated pads and apparatus employing electrically-heated pads, all for surgical and curative purposes. Also No. 640,286, Class 11. Electric heating apparatus in the form of pads (not for surgical or curative purposes).—Walter Reik, 65, Lancaster Close, St. Petersburgh Place, London, W.2.

ZIP. No. 640,934, Class 11. Electrically heated hot water storage apparatus.—Heatrae, Ltd., Heatrae Works, St. George's Street, Norwich.

EKCO. No. 638,664, Class 21. Small domestic utensils and containers made of plastics.—E. K. Cole, Ltd., Ekco Works, Priory Crescent, Southend-on-Sea.

A.C. to D.C. Conversion

Selection of Equipment for Power Installations

By T. D. Martin,
B.Sc. (Eng.), A.M.I.E.E., Grad.I.Mech.E.

WHEN considering the installation of equipment for the purpose of producing D.C. from A.C. there are many points which the engineer has to take into account before a sound decision can be made, and the problem, upon consideration, may present facets which were not apparent at first sight.

The choice of equipment lies primarily between mercury-arc rectifiers and rotating machinery, and these two types may be divided into glass-bulb or steel-tank rectifiers for the former and rotary convertors or motor-generator sets for the latter. The factors governing the choice of the type of equipment most suitable for a specific requirement may be roughly divided into two classes; one embracing the non-economic factors and the other the purely economic factors. The non-economic factors are those to be taken into consideration before the economic factors are considered, and may, in certain cases, completely overrule the latter. A non-economic factor which may influence the decision in favour of the mercury-arc type of equipment is the noise associated with rotating machinery, and the situation may be such that this may become the deciding factor.

The purpose for which the d.c. supply is required and the nature of the duty cycle should be taken into account before the actual finances of the problem are considered. When the d.c. side is subjected to sudden overloads and short-circuits, as in the case of traction supplies, special precautions have to be taken in the design of rotary machines in order to minimize the danger of commutator flash-over, and very high-speed d.c. circuit-breakers are required. Mercury-arc type rectifiers can withstand such heavy overloads without extra precautions being taken in their design. On the other hand, rotating sets can usually withstand light overloads for longer periods than mercury-arc rectifiers, owing to their greater heat-dissipating capacity. Mercury-arc installations have the disadvantage that fluctuations of supply voltage are reflected on the d.c. side unless automatic voltage control of the d.c. output is employed, which, in addition to increasing the cost of the equipment, also affects the power factor. With rotary machines, small a.c. variations are not reflected in the d.c. side. Severe a.c. line disturbances or sudden d.c. overloads will not, however, cause mercury-arc rectifiers to trip out, but such disturbances can cause synchronous sets to fall out of step with resultant delay in having to start them up again.

The d.c. output of mercury-arc rectifiers is rough, in comparison with that of d.c. generators, ripples being present of the order of 4 per cent in the case of 6-anode rectifiers. As the fundamental ripple frequency is the product of the frequency of the a.c. supply and the number of anodes, it follows that the ripple fundamental and lower harmonics are within the audio range, and if these are transferred inductively to neighbouring telephone circuits considerable interference can be caused unless tuned suppressors are installed in the output circuit of the rectifier.

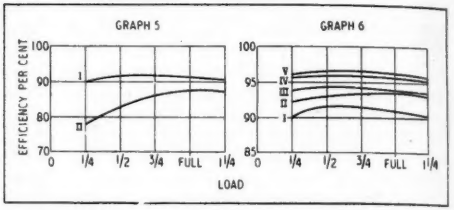
Unless reduced-voltage starting is employed, rotary equipments can impose a starting shock to the a.c. system, whereas mercury-arc equipments start instantaneously on full voltage without any such shock. Furthermore, a rotary convertor or m.g. set adds to the possible sources of faults on the a.c. system to a far greater extent than a mercury-arc installation, neglecting the transformer and high-voltage switchgear which are usually common to both types of equipment. On the other hand, mercury-arc rectifiers have the disadvantage of distorting the wave-form of the a.c. supply and where d.c. voltage control is obtained by grid control the power factor of the rectifier varies almost directly with the output voltage from a maximum of about 0·92 lagging at full voltage.

In order that a critical comparison of costs may be made between the various possible types of equipment great care has to be taken to ensure that each equipment is similar in nature and class, or else it will be impossible to come to an unbiased decision. Whereas in one factory or works conditions may obtain to allow specifications which

result in a certain type of equipment being the most economical, in another establishment the requirements may be such that that type of equipment would be far from the most economical. This is very noticeable when considering the starting of rotary equipment, the difference in cost between a set using direct-on starting and another using reduced-voltage starting sometimes being the deciding factor when compared with a mercury-arc installation. However, basing the choice of equipment in each type of installation on sound engineering practice and specifications as similar as possible the graphs Nos. 1 to 4 may be taken as very fair guides as to the relative initial costs of complete installations when comparing steel-tank mercury-arc rectifiers with m.g. sets.

Graph 1 is for an a.c. input voltage of 440 and a d.c. output voltage of 250, the m.g. set having a direct-on started induction motor. Graph 2 is for an a.c. input voltage of 2,200 and a d.c. output voltage of 250, the m.g. set having a direct-on started synchronous induction motor, automatic voltage control being employed in both cases Graph 3 is for an a.c. input voltage of 6,600 and a d.c. output voltage of 250, reduced voltage being employed for starting the synchronous induction motor of the m.g. set and automatic voltage control being used in both cases. Graph 4 is for similar equipment to that last mentioned, except that the d.c. output voltage is 600. Many similar graphs for glass-bulb mercury-arc rectifiers and for higher d.c. voltages could be obtained, but, obviously, owing to market fluctuations, such graphs can only be used as an initial guide to the relative anticipated costs, and when a decision has been reached as to the possible alternatives available firm tenders should be obtained in each case.

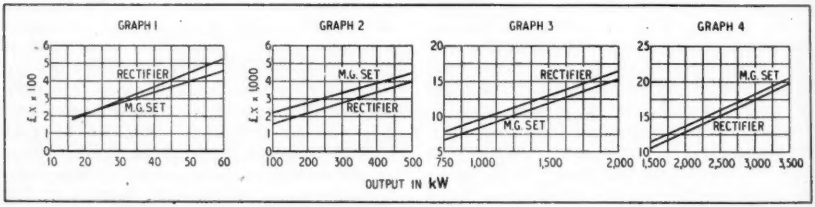
The cost of installation is generally greatest in the case of rotating machinery. Because of the much greater weights involved, heavier foundations and lifting gear are required for this type of equipment, and the foundations must also be designed to withstand vibration. Rotating equipment also requires careful alignment on the foundations and the provision of air ducts for cooling, and suitable air circulating and filtering equipment. Glass-bulb type mercury-arc rectifiers do not require such additional equipment, although steel-tank rectifiers require a cooling-water circulating system.



Group B (Figs. 5 and 6)—The mercury-arc equipment is more efficient throughout its range, and efficiencies of mercury-arc installations vary considerably and directly with output voltages

Cost of maintenance again weighs heavily in favour of the mercury arc. Glass-bulb rectifiers require least maintenance of all, as in small installations, they have no moving parts, and in large installations only a small motor-driven fan for cooling the bulb. Metal-tank rectifiers, being continuously evacuated, have auxiliary pumping equipment and control gear requiring regular maintenance, but nothing to compare with the commutator, brushgear, slip rings, and large bearings of rotary sets. Figures available show that for installations of the same size the annual maintenance costs of mercury-arc equipments are approximately half those of rotating equipments.

With regard to efficiency, graph 5 shows typical efficiency curves for: (i) a mercury-arc



Group A (Figs. 1 to 4)—The relative initial costs of complete installations vary considerably with different supply and other conditions

installation, and (ii) an installation employing a synchronous m.g. set. From this it can be seen that the mercury-arc type of equipment is not only more efficient throughout its range, but that it possesses very marked advantages at light loads. For this reason very careful consideration should be given to the estimated load factor when calculating annual running charges. Efficiency curves for mercury-arc installations also vary directly with output voltage, owing to the arc drop being constant, and typical curves for (i) 250 V, (ii) 480 V, (iii) 600 V, (iv) 1,200 V, and (v) 1,500 V are as shown in Graph 6. These figures may not only decide the choice of converting equipment, but also the d.c. voltage, as it may be more economical to raise the d.c. voltage in order to benefit from the higher efficiencies so obtained.

The foregoing figures refer to single-bulb or single-tank multi-anode rectifiers. Still higher efficiencies may be obtained by enclosing each anode in its own tank. This is because the anodes are not exposed to highly ionized mercury vapour during the negative portion of the voltage cycles, and can, in consequence, be situated nearer to the surface of the mercury. A lower arc drop is thus obtained, and, as the arc drop is constant irrespective of voltage, the improvement in efficiency is most noticeable in low-voltage installations. Efficiency improvements of the order of 3 per cent at 250 V, falling to 1 per cent at 600 V, have been effected by this means.

Power Factor Considerations

If it were desired to utilize the equipment for power-factor control, then the choice would lie with a motor-generator set having a synchronous motor. This type of machine is preferable to the rotary convertor, as the synchronous motor can be made to operate at a power factor varying over very wide limits, whereas, owing to armature heating near the slip-ring tappings, it is not advisable to operate a rotary convertor at a power factor much lower than 0·95. This point should be considered when penalty is being incurred under a power-factor clause in the electricity supply agreement, or would be incurred if any other type of converting equipment were installed.

With adequate maintenance there should be little difference in the ultimate life of any of the possible forms of converting equipment, and, expressed as a percentage, depreciation charges may be taken as the same in each case.

Having decided upon the possible alternatives, the final choice resolves itself into a consideration of annual charges. In each case details of the entire equipment should be worked out and the initial cost and cost of installation obtained. From these figures the corresponding annual charge could be calculated. To this figure should be added the annual depreciation charge, the estimated annual cost of maintenance, and the estimated annual running costs. Finally, where a synchronous motor is being considered, its account should be credited with any annual saving obtained by power-factor improvement. The equipment to select for installation is then obviously that with the lowest total annual charges.

Canadian Electrical Production

It is now possible to take the story of Canadian electrical manufacturing progress a stage further, as the Dominion authorities have released particulars of the production of that industry in 1943. Its total value was $245,771,000, as compared with $208,873,000 in 1942, an increase of 17 per cent. The number of firms concerned was 223, of which 160 were operating in Ontario. There were however some important producers of electrical supplies who were not included among those reckoned in the totals mentioned. Altogether their production of such electrical items was valued at an additional $15,000,000.

The accompanying table shows values of various classes of electrical goods in 1943, with increases or decreases as compared with 1942.

Class of Goods	Gross Selling Value at Works	
	1943 $000	Inc. or dec. on 1942 $000
Batteries and parts	582	— 1,671
Vacuum cleaners	246	— 1,316
Generators, a.c.	5,001	+ 1,227
Generators, d.c.	2,345	+ 1,374
Lamps, standard size	5,618	— 1,014
Lamps, miniature	1,221	— 184
Washing machines		
Furnaces	446	— 534
Watthour meters	639	— 551
Wires and cables	33,555	+ 647
Motors, a.c. and d.c., and parts	14,653	+ 1,125
Radio apparatus and parts other than valves and transformers	58,795	+ 26,239
Radio valves	2,256	+ 978
Indicating and graphic instruments	1,953	+ 469
Refrigerators	764	— 5,819
Transformers and parts	8,444	— 3,035
Telephone material	8,765	+ 350
Stoves	302	— 710
Switchgear (except telephone)	10,097	+ 916
Wiring devices	4,215	+ 118
Welding apparatus	2,082	— 24
Apparatus and parts n.e.s.	43,397	+ 9,680

PARLIAMENTARY NEWS

By Our Special Reporter

Coal and Electricity

IN the House of Commons on July 24th, during a debate on the coal-mining industry, Mr. H. Macmillan, dealing with stocks, said that in April, 1944, the coal distributed and in the hands of users amounted to 12,699,000 tons; in April, 1945, to 10,000,000 tons; and in April, 1946, to 6,800,000 tons. That was a decline of nearly half in two years. Was that correct? Coming to the more specialized uses and stocks, he said that there was a classification given in the figures of railways, gas and electricity. He appreciated that this classification was about 26 per cent more than the normal. That was, of course, largely due to the fact that both domestic and industrial consumers were tending to take coal in the shape of electricity rather than directly into their grates or their furnaces. But he was also informed that the stocks were now one-third of normal for those undertakings. Was that true?

Mr. Shinwell, the Minister of Fuel and Power, said that the estimated inland consumption of coal this year was 188,000,000 tons. That was the highest figure ever known. As regarded the public utilities and industry, they would consume more coal than in any non-war year since 1923, or, indeed, since 1913. If one excluded the war years, the consumption by public utility undertakings was higher than anything yet experienced. For example, gas consumption in the present coal year was 23,700,000 tons. To-day it was running at a rate of 24 per cent higher than in 1938. As regarded electricity, the consumption was 26,300,000 tons, which was 2,300,000 tons higher than in 1945, and 76 per cent. higher than in 1938. That was a most amazing increase, and it was largely responsible for the present position. In 1922 there was consumed in the domestic sphere 370 million kWh; in 1938, 5,360 million; in 1944, 7,799 million; and in 1945, 8,848 million. This year they expected it to be in excess of that figure.

Mr. Orr-Ewing pointed out that many machines on farms, such as milking machines, were driven by electricity. It was essential that milk supplies should be safeguarded and it might be necessary to reconsider what fuel should be allocated to the electricity companies. Unless an adequate supply of electricity was available in the rural areas, milk, among other things, would not be available.

Major Lloyd-George referred to the low stocks of coal in hand, especially for public utilities. Was the position safe? The electricity stock position at the moment was just over two weeks. The tremendous increase in the consumption of gas and electricity was largely because people were not going to go cold. Owing to war conditions much plant had been damaged and owing to shortage of labour and materials the repair and maintenance of plant was far in arrears. They had indications of that last winter and the winter before that. During the peak load periods many stations in various parts of Britain had to cut off the load. The position this winter would be very much more serious owing to the increased consumption. What priority did the mines get for labour and materials in order to speed up the work of maintenance and repair?

Mr. W. Shepherd said that the Minister had made great play about the amount of extra fuel consumed by public utility concerns. He suggested that a considerable proportion of that increase was accounted for by the poor quality of the fuel supplied. What was the plan for carrying out the Reid Report? What steps had the Ministry taken to overcome such fundamental bottlenecks as the short supply of castings and switchgear? It took nearly twelve months to get the switchgear delivered and unless some improvement was made we were going to be in a difficult position.

Supply to Old Buildings

On July 23rd, Mr. Vane asked the Minister of Fuel and Power whether he would give an assurance that, where no alternative method of light or power was available, old premises, in respect of which applications for the supply of electricity had been outstanding for several years, would not be treated any less favourably than new buildings.

Mr. Shinwell replied in the affirmative, but said that only in very exceptional cases would it be found that no alternative method of light or power was available.

Cable and Wireless Bill

A Select Committee of the House of Lords has this week been considering the Cable & Wireless Bill. Petitions were presented on behalf of the Cable & Wireless operating and holding companies contending that there had been no public or commercial demand for the proposed scheme which would be unworkable.

Mr. A. Capewell, K.C., for the Government, said that the Bill was in the best interests of the peoples of the Empire and of telecommunications users. It involved no change of employment for any member of the operating company's staff, other than the directors who would retire. The Holding Company would survive and be able to embark upon new ventures.

Lord Pakenham said that the Government made no allegation regarding the way in which Cable & Wireless, Ltd., had carried out its duties.

Fluorescent Display

Tube Flashing Circuit Explained

AFTER being used exclusively and with outstanding success for industrial purposes, fluorescent lighting, particularly by so-called hot-cathode tubes, of which the familiar 5 ft 80-W size is the best known, is now being introduced by degrees into domestic and commercial lighting in shop windows and displays. An unusual application during the recent victory celebrations was the successful use of "Atlas" fluorescent tubes in standard fittings (Fig. 1) for temporary floodlighting.

There is some danger that over-enthusiastic exploitation of this illuminant may cause disappointment if it is expected to function under conditions different from those for which it was designed. It should be borne in mind, for instance, that with the present tube the delay between the original switching on and the striking of the tube arc is by no means a weakness of the

Fig. 1.—Temporary fluorescent floodlighting during the victory celebrations in London

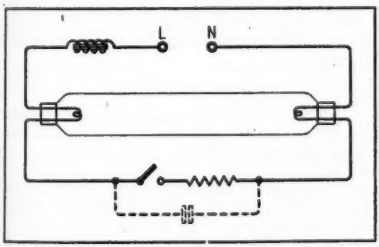


Fig. 2.—Circuit arrangement of shorting switch for flashing fluorescent tube

available types of starter switches, but constitutes the time necessary for heating up the tube filaments to enable them to emit electrons freely and start the discharge. The life of the tube is largely determined by the frequency of switching, as the emissive coating of the filaments is exhausted most rapidly during this period. Fluorescent tubes switched on, say, once a day and alight for many hours, will last considerably longer than if they are switched on and off at frequent intervals. This fact and the delay in starting would appear to render the present type of tube unsuitable for any display which requires tubes to be switched in quick rotation. The delay with standard glow or thermal starter switches amounting to at least 2 and often 6 to 8 seconds would spoil the effect completely and create an irritating impression of blinking and flickering. Furthermore, if a tube were switched on and off, say, twice a minute, its life would be reduced to a few days and the tube replacement bill would be correspondingly heavy.

The problem therefore was to design a circuit which does away with the ordinary starter switches and allows fluorescent tubes to be switched on and off at frequent intervals without serious reduction of life. The research laboratories of Thorn Electrical Industries, Ltd., found a solution that proved satisfactory. A standard choke coil is used to limit the current to the tube, but across the filaments there is a subsidiary circuit consisting of a switch with a suitable resistance in series for reducing the starting current. In addition, a condenser may be used (shown dotted, Fig. 2) for automatic initial starting of the discharge. When first connected, the switch may be closed so that the two tube filaments are connected in series across the main supply, heating up in the process. When the switch is opened the discharge will immediately strike across the lamp as the filaments will then be freely emitting electrons. The discharge is extinguished by

closing the switch, the current flowing through the filaments maintaining them in a hot condition ready to strike again immediately the switch is opened. The switch can be operated manually or automatically by any flashing or timing mechanism. It will be appreciated that, as the tube filaments never cool down, frequent switching does not lead to excessive shortening of the tube life. When the discharge within the tube is eliminated by the shorting switch, a glow will remain at the ends. It is, therefore, advisable to mask the ends by suitable sleeves.

The circuit was first used for the "Bouquet of Light" at the *Daily Herald* "Modern Homes" Exhibition at Dorland Hall, London, in March, last, and was employed with considerable success on the "Atlas" stand at the I.M.E.A. exhibition at Blackpool where a range of attractive coloured fluorescent tubes were switched on one after another in quick succession.

I.E.C. Meeting

Resumption of Activities

(From a Correspondent)

ON July 8th and 9th in Paris at the Maison de la Chimie, the Council of the International Electrotechnical Commission met under the chairmanship of MONSIEUR P. AILLERET, president of the French Electrotechnical Committee.

This was the first meeting to be held since 1938, when the Council met in Torquay under the chairmanship of the late Mr. James Burke (United States). At the Paris meeting delegates from the national committees of sixteen nations (including the United States and the U.S.S.R.) were welcomed on behalf of the French Government by General P. Salmon, Commissaire á la Normalisation.

Since the last meeting the following have passed away: Col. R. E. Crompton (honorary president), Mr. James Burke (U.S., past-president), M. C. Duval (president, French National Committee), and Dr. Clayton H. Sharp (president, U.S. National Committee). The resignation of Professor Lombardi (Rome), who was unable to attend the meeting owing to increasing age, was regretfully accepted. As chairman of the I.E.C. Vocabulary Committee he had a large share in the preparation of the International Electrotechnical Vocabulary, which was issued in 1937 and reproduced in 1940 and completely sold out.

New Officers

M. E. Uytborck, president of the Belgian National Committee, was elected to the presidency of the I.E.C. in succession to Professor Lombardi, Dr. P. Dunsheath, president of the Institution of Electrical Engineers, was elected honorary secretary to succeed the Earl of Mount Edgcumbe, and M. E. Brylinski, honorary president of the French National Committee, was elected an honorary president. Mr. C le Maistre continues his long connection with the Commission as general secretary, which began with its official constitution in London in 1906.

The matters of chief importance which occupied the attention of the delegates were the re-forming of the large number, about thirty, of the technical advisory committees and the constitution of some new ones. The Council favourably considered the invitation of the United Nations Standards Co-ordinating Committee to affiliate with the proposed new international organization (International Standards Co-ordinating Association) which will replace the UNSCC directly it comes officially into being. A constitution for the Association, which was drafted in New York last October, is now under detailed study by the national standards bodies and will be submitted for final approval in London next October. The I.E.C. is to retain its name and its own procedure in all technical, administrative and financial matters. Consequently, the proposed liaison with the larger body, though close, will in no way hamper its work or its natural development.

Matters of Urgency

In reviving the technical work, priority has been given to the committees on lamp caps and holders, radio interference and standard voltages as matters of urgency. A new committee has been formed to deal especially with voltages above 200 kV and another with a British secretariat is to deal with flameproof enclosures. Several other committees have been renominated but come on a lower priority. Meetings of these committees are to be held with the least possible delay and, on the invitation of the Swiss National Committee, some (whose preparatory work is sufficiently advanced) will be convened in Switzerland in the summer of next year.

The meeting closed with thanks to the UNSCC for enabling the central office of the I.E.C. to function again, to the French National Committee for its hospitality and to M. Ailleret for his conduct of the meeting, during which an excellent spirit of co-operation prevailed among the delegates.

ELECTRICITY SUPPLY

Installations on Small Holdings. New Plant for Portobello.

Bexhill.—PUBLIC LIGHTING CHARGE.—The Fuel and Power Committee recommends an increase from 1½d. to 1½d. per kWh for electricity for public lighting.

Bradford.—MILL SCHEMES.—The Electricity Committee has made agreements for the supply of electricity to Legrams Mills, Field Head Mills, New Lane Mills, and the Bradford Dyers Association, Ltd., at Oakwood Dye Works. An additional supply is to be given to Hollings Mill at a cost of £14,959.

SUPPLY ARRANGEMENT.—The Electricity Committee has arranged terms with the Yorkshire Electric Power Co. in regard to a scheme for mutual assistance in the supply of electricity at Thornbury and Norwood Green and for an emergency supply by the Corporation in Clayton.

Brighton.—LOWER CHARGES PROPOSED.—In view of the net surplus of £45,000 on the past year's working of the electricity undertaking, compared with £25,600 in 1944-45, the Electricity Committee proposes to reduce charges. The recommended concessions will aggregate £28,000 in a full year.

Dorchester.—HIRE AND HIRE PURCHASE.—The Electricity Committee is to reintroduce hire and hire purchase schemes and has instructed the borough electrical engineer to submit proposals for consideration.

Edinburgh.—NEW PLANT FOR PORTOBELLO.—Details were given at a recent meeting of the Public Utilities Committee of proposals for the installation of new plant at the Portobello generating station at an estimated cost of £2,500,000. A direction from the Central Electricity Board calls for the installation of the first of two 60,000-kW turbo-alternators each of which will be driven by single 540,000 lb per hr pulverized fuel boilers. There will be room eventually in the existing building for six of these units.

Hampshire.—ELECTRICITY FOR SMALL HOLDINGS.—The County Council Small Holdings Committee reports that in dealing with applications from tenants for the installation of electricity on their holdings, the policy has been to carry out the work and charge the tenants a suitable additional yearly rent for the improvement, based on a small percentage of the net cost of the work. Several applications for this improvement have recently been received and having regard to the difficulty in getting work done within a reasonable time, the Committee has decided to encourage the tenants to have the installations carried out themselves at their own expense and to permit them to proceed on these terms subject to wiring being enclosed in steel tubing where the installation is in buildings mainly of timber.

Islington.—SUPPLY TO FLATS.—The Electricity Committee has arranged for the provision of electricity to blocks of flats at a cost of £53,040.

Llandudno.—INCREASED CHARGES.—The Town Council has received authority to increase electricity charges after September 30th. The price for lighting will be advanced by ½d. to 4d. per kWh, and for domestic heating and cooking, by ½d. to 1½d. for the first 50 kWh, and ¾d. for all kWh in excess. It is anticipated that these increases will cover the estimated deficit.

Manchester.—TRANSFORMER REPLACEMENT.—Load development in connection with the bulk supply to Sale makes it necessary to replace two 5,000-kVA transformers by two of 10,000 kVA. The estimated cost, including modifications of 33-kV switchgear, is £22,350.

LOAN FOR APPARATUS.—It is proposed to apply for permission to borrow £55,800 to cover expenditure during the year to March, 1947, as follows: Meters £9,000; motors £1,500; cookers £28,300; wash boilers £1,000; and water heaters £16,000. Most of this is needed in connection with housing development.

St. Marylebone.—CHEAPER ELECTRICITY.—The price of electricity for all forms of lighting, heating and cooking is to be reduced.

Stafford. — STREET LIGHTING.—The Town Council is to order 100 street lamps costing £982, to meet initial requirements on the new Silkmore and Rising Brook estates.

Tynemouth.—SHORTAGE OF EQUIPMENT.—The Corporation has been informed that work on houses in Nelson Terrace, Percy Main, is being held up owing to shortage of electrical equipment. The Corporation has decided to interview the manufacturers and the appropriate Government department to secure a speeding up in supplies.

PURCHASE OPTION.—The Council has applied for a further extension after January 31st, 1947, of the Council's option to purchase the electricity undertaking in the New York area owned by the North-Eastern Electric Co., Ltd.

Upton-by-Chester.—STREET LIGHTING. — The Cheshire County Council has approved the application of the Parish Council for consent to borrow £888 for conversion to electric lighting of eighty-three gas standards.

West Bromwich.—ELECTRICITY SHOWROOMS.—The Electricity Committee has accepted a tender of £14,333 for the erection of electricity showrooms and offices in High Street.

Whitby.—SUPPLY TO GOATHLAND. — The North-Eastern Electric Supply Co., Ltd., is to supply electricity to the village of Goathland by means of underground cables. Ten years ago a plan was drawn up for supplying the village by overhead lines, but this was opposed on the grounds that it would impair the amenities of the district. The company's new plan, which has been approved, provides for taking overhead lines from Grosmont to the outskirts of Goathland and afterwards underground cables will be used in the village itself.

Yorkshire. — FARM ELECTRIFICATION. — The Yorkshire Electric Power Co., Ltd., and its associated concerns have prepared a plan for supplying electricity to farms, and discussions on the subject have been conducted with the National Farmers' Union. It is proposed to introduce a standard tariff by which any farm within half a mile of the company's 11,000-V lines will be able to obtain electricity without any capital outlay or guarantee.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

The General Electric Co., Ltd.—Some of the many problems which confront industry in the immediate post-war period were dealt with by Sir Harry Railing, chairman of the company, at the annual meeting held on July 25th. After reviewing the accounts Sir Harry said that the only way of making good the arrears of the past six years was to increase the total output from each worker, from each industry and from the country as a whole. We must concentrate on what was immediately necessary and possible, whatever our ultimate long term aims might be. We must not increase the problems which faced us by adding to them ideological readjustments which were not absolutely essential.

Referring to nationalization, Sir Harry said that whatever one's views might be on the merits or demerits of state ownership of industry, any industry and any country failed in its duty if it tried to tackle too many problems at the same time, for theoretical or political reasons, without having the means from a practical production point of view and sufficient spare talent from the teaching, planning and administration point of view, to do justice to them all simultaneously.

The collapse of Japan came rather more suddenly than was anticipated, and resulted in large scale cancellation of orders. They were now faced with a large demand both at home and abroad over the whole range of the company's products but they were limited in their production by the supply of raw materials. The gravest general shortage was in the supply of castings, and of sheet steel and stampings which limited their engineering output; of lead which limited the output of cable; and ceremics which affected many electrical appliances. They were also limited by a shortage of labour in a good many districts where their factories were established. They had moved a number of factories and started new ones in development areas where labour was more easily available. There were insufficient engineers, draughtsmen and skilled works administrators available, while during the change-over period they were handicapped by the necessity of re-arranging their factories by bringing production methods up to date when long deliveries for new tools were unavoidable, by the closing of dispersal factories and the reconstruction of "blitzed" establishments. Their transformer works at Witton, their telephone works at Coventry and the cable works at Southampton suffered greatly from bomb damage, but had been reconstructed and were either in full working order or approaching it. These difficulties combined to restrict for a period the output of their works and of industry as a whole.

Whilst industry had to reckon for a time with restricted output, it had of necessity to carry a high overhead burden of planning, re-equipment, re-organization, design and research staff, the results of whose efforts could only show in years to come, and the cost of which, even if distributed over a number of years, had not yet been sufficiently realized, much less taken care of in the present prices. Similar remarks applied to foreign markets. They had to explore new markets and incur new risks, and had to reckon with the strong and increasing tendency in the Dominions and other countries to start their own manufacture of certain electrical goods. The narrow margin of profit allowed by the Government, without taking any of these factors sufficiently into consideration, favoured routine development and discouraged long-term planning and the taking of risks which were more than ever necessary during periods of scientific and industrial advance.

The company was expanding its manufacturing facilities at Witton, Erith and Coventry to increase its capacity for heavy engineering, traction and telecommunication work. They had taken over a factory at Shaw for the manufacture of lamps and valves; they were moving their cooker factory to Yorkshire; and were in course of transferring other activities to the North-East Coast. They were extending their manufacturing interests in Australia, South Africa and India, and were doing their utmost to satisfy the requirements of their friends all over the world, and to expand their export business. Their exports last year were 90 per cent in excess of the 1945 figure, and were actually higher in value than before the war.

It would seem common sense not to add unnecessarily to these problems, by creating still further difficulties, by adding further uncertainties and delays to development plans already worked out by responsible industries.

The Chloride Electrical Storage Co., Ltd.—At the recent annual meeting, Mr. W. S. Naylor (chairman), who presided, said that they had an extensive plan for modernizing their various works which should give improved conditions for the workpeople and increased efficiency in production. Provision would also be made for the expansion of the research departments. The expenditure would be considerable, but they believed it could be met out of current resources as the work proceeded. The world's battery market was embarrassed by the strictly limited quantities of essential raw materials. New developments in plastic materials were furnishing, for the time being, promising substitutes for accessories, hitherto of rubber and wood, and the position should gradually improve. There was a definite increase in the use of batteries in power stations, and substations, for internal duties, and they expected a considerable volume of business in connection with the extension of the telephone system. They also anticipated a revival in their marine business. There was every indication that the demand for their "Keepalite" emergency lighting system would be good once general building became possible. There had been a pressing demand for batteries primarily of their "Exide-Ironclad" type, for electric traction. It had been impossible to meet requirements fully, priority being given to batteries for industrial trucks for factory, railway station and docks transport.

Experience gained during the war was now embodied in the design and construction of batteries for civilian aircraft, and the development of jet turbine machines necessitated still larger batteries capable of giving up to 20 H.P. for about half a minute for running the turbine up to speed before the combustion elements were switched on. Generally speaking, inquiries from overseas were greater to-day than at any time in the company's history.

Newton Brothers (Derby), Ltd., report a net profit for the year ended March 31st of £14,759, as compared with £13,645 for the preceding year. The dividend for the year is maintained at 17½ per cent, less tax, and in addition this year a special bonus is being paid of 7½ per cent less tax. The report states that the trading for the past year has been attended by difficulties arising from heavy cancellations of Government contracts the adverse effects of which will be more reflected in trading for the current year. In these circumstances the payment of the special bonus must not be construed as indicative of a raising of the normal dividend rate.

A. C. Cossor, Ltd., report net profits for the year ended March 31st last of £129,001, as compared with £179,430 for the preceding year. The latter figure included three years' dividends from Sterling Cables, while the current year includes one year's dividend. It is proposed to pay a final dividend of 7 per cent, and a cash bonus of 2½ per cent making 12½ per cent, free of tax, for the year (same).

The Telephone Manufacturing Co., Ltd., reports a trading profit for 1945 of £410,559, as compared with £373,120 for 1944, and after deducting expenses, deferred repairs, depreciation, etc., there is an available balance of £272,495. The final ordinary dividend is 6½ per cent, making 9 per cent for the year (unchanged), and £10,973 is carried forward (against £10,010 brought in).

The Brush Electrical Engineering Co., Ltd., announces that owing to delay in completing the 1945 accounts, as prices for certain Government contracts remain unsettled, a formal annual meeting called for to-day (Friday) will be adjourned until later in the month or early September. Satisfactory progress in settling the amounts due is reported.

The Coventry Gauge & Tool Co., Ltd., is offering 250,000 2s. ordinary shares to present ordinary stockholders at 8s. 6d. per share. The company is also issuing 175,000 5 per cent cumulative redeemable preference shares of £1 each for which a financial house is subscribing or finding a market at 20s. 6d. each.

Telephone Properties, Ltd., reports a net profit for the year of £29,935, as compared with £29,322 for the previous year. The dividend for the year is unchanged at 6 per cent.

G. N. Haden & Sons, Ltd.—Permission is being sought to deal in the ordinary shares of this company, which specializes in the design and erection of heating, air-conditioning, electrical and sanitary installations for buildings. The company is a member of the E.C.A. The issued capital is £180,065, consisting on £27,200 8 per cent cumulative preference £1 shares and £152,865 in 611,460 ordinary shares of 5s. each. The London & Yorkshire Trust is purchasing 200,000 of the ordinary shares at 22s. 2½d. net.

The John Thompson Engineering Co., Ltd., reports a net profit for 1945 of £124,718, as compared with £115,212 for 1944. General reserve receives £35,000 and dividend reserve £15,000. The final ordinary dividend is 12½ per cent, making 17½ per cent (same) plus a bonus of 5 per cent (same). The balance carried forward is £57,049 (against £57,302 brought in).

The British Thermostat Co., Ltd., is to create 150,000 4½ per cent preference shares of £1 each. Of these 100,000 are to be offered to holders of the ordinary and founders' shares, at 21s. each, in the proportion of one new share for each six held.

The Globe Telegraph & Trust Co., Ltd., reports a net revenue for the year to June 30th of £215,118, against £183,444 for 1944-45. The final ordinary dividend is 2 per cent, making 5 per cent, tax free (same). The balance carried forward is £151,923 (against £134,812 brought in).

The Kalgoorlie Electric Power & Lighting Corporation, Ltd., has announced a dividend for the year of 7 per cent, as compared with 5 per cent for 1944.

The Delhi Electric Supply Co., Ltd., is again paying a final dividend of 5 per cent free of tax, making 9 per cent tax free for the year.

The Metropolitan Electric Supply Co., Ltd., is paying an unchanged interim dividend of 3 per cent.

British Rola, Ltd., announces the payment of a 15 per cent dividend on the ordinary shares for 1945-46 (same).

The London Passenger Transport Board is again paying an interim dividend on its "C" stock of 1½ per cent.

Mather & Platt, Ltd., are maintaining their interim dividend at 4 per cent.

Engineering Components, Ltd., is paying an interim dividend of 10 per cent (same).

New Companies

British United Traction, Ltd.—Private company. Registered July 22nd. Capital, £50,000. Objects: To carry on the business of merchants, designers, manufacturers, exporters, marketing agents, builders, assemblers, and repairers of electric trolley-buses, passenger and commercial vehicles of all kinds, electric and motor cars, etc. The directors are: C. W. Reeve, Hillside, Barnet Lane, Totteridge, Herts (chairman, Associated Equipment Co., Ltd.); C. B. Nixon, The Leylands, Lytham St. Annes (governing director, Leyland Motors, Ltd.); H. Spurrier, Incol Cottage, Walker Lane, Preston (director, Leyland Motors, Ltd.); S. Markland, Burwood, Shaw Hill, Chorley, Lancs. (director, Leyland Motors, Ltd.); A. S. C. Chattey, 61, Eyre Court, Finchley, N.W. 8 (general sales manager, Associated Equipment Co., Ltd.); and E. J. H. Jones, 262, East Lane, Wembley (works manager, Associated Equipment Co., Ltd.). Registered office: Hanover House, 14, Hanover Square, W.1.

Easco Electrical, Ltd.—Private company. Registered July 15th. Capital, £4,000. Objects: To acquire the business of electric equipment

manufacturers carried on by E. L. Eastell and Margery M. Eastell, as Easco Electrical at 6/8, Brighton Terrace, Brixton, S.W. Permanent directors: E. L. Eastell (chairman) and Mrs. Margery M. Eastell, both of 88, Upper Tulse Hill, S.W.2. Registered office: 6/8, Brighton Terrace, Brixton, S.W.

J. & D. Ellison, Ltd.—Private company. Registered June 26th. Capital, £1,000. Objects: To carry on the business of electrical engineers and general electrical installation contractors, etc. Directors: J. Ellison, "Mayfield," Gisburn Road, Barnoldswick, and Dorothy M. Ellison, "Wood End," Salterforth, nr. Colne. Registered office: 33, Albert Road, Barnoldswick.

Current Appliances, Ltd.—Private company. Registered June 26th. Capital, £1,000. Objects: To carry on the business of manufacturers and repairers of, and dealers in, electrical plant, machinery, appliances and accessories, etc. Subscribers: G. W. C. Sinclair, "Hindhead," Queens Rise, Richmond, Surrey, and N. L. Pearce, 2, Denbigh Gardens, Richmond, Surrey. Solicitors: Parker, Thomas & Co., E.C.2.

Bakers (Kingswood), Ltd.—Private company. Registered June 25th. Capital, £1,000. Objects: To carry on the business of manufacturers and repairers of, and dealers in, dynamos, motors, armatures, magnetos, etc. Directors: J. Baker, 72, Hillingdon Road, Kingswood, Watford, and two others. Registered office: 72, Hillingdon Road, Kingswood, Watford.

Southern Counties Electrical and Radio Co., Ltd.—Private company. Registered June 27th. Capital, £300. Objects: To carry on business as indicated by the title. Directors: A. V. G. Harcourt, 13, Grove Road, Maidenhead, and L. Phillips, 9, Southbourne Close, Pinner, Middlesex.

Electrical Services (Gloucester), Ltd.—Private company. Registered June 26th. Capital, £1,000. Objects: To carry on the business of electrical engineers and general electrical installation contractors, etc. Director: F. W. Hawkins, of Tutnalls, Lydney, Glos. Registered office: 31, Queen Street, Cardiff.

J. Bowden (Stalybridge), Ltd.—Private company. Registered June 28th. Capital, £2,000. Objects: To acquire the business of an electrical engineer and contractor, and wireless dealer, carried on by the administrators of Joseph Bowden at 17, Market Street, Stalybridge, Cheshire. Permanent directors: Mrs. Dorothy Bowden, 64, Montague Road, Ashton-under-Lyne, and E. Bowden, 30, Abingdon Street, Ashton-under-Lyne. Registered office: 17, Market Street, Stalybridge, Cheshire.

Lawrenson & Rushton, Ltd.—Private company. Registered in Edinburgh June 28th. Capital, £5,000. Objects: To acquire the business of Lawrenson & Rushton, electrical engineers and contractors, 1012/4, Dumbarton Road, Glasgow. Directors: R. H. Lawrenson, 3, Dowanside Road, Glasgow, W.2, and I. C. Rushton, Forest Villa, Hector Road, Glasgow, S.1. Secretary: I. V. Rushton. Registered office: 1012/4, Dumbarton Road, Glasgow.

H. C. Robinson (Electrical Contractors) Ltd.—Private company. Registered July 2nd. Capital, £250. Objects: To acquire the business of an electrical contractor carried on by H. C. Robinson at 38, Kenway Road, Earls Court, S.W. Directors: H. C. Robinson, G. H. Robinson and D. H. Robinson, all of 6, Coniston Road, N.10. Registered office: 58, Kenway Road, Earls Court, S.W.

Sloggett & Slade, Ltd.—Private company. Registered July 3rd. Capital, £2,000. Objects: To acquire from W. F. Sloggett and C. H. Slade the business of manufacturers of electric therapeutic appliances now carried on by them at 73a, De Beauvoir Road, N.1. Subscribers: C. J. Slade, 156, Haynes Road, Hornchurch, Romford, and W. F. Sloggett, 31, Sussex Way, Cockfosters, Herts. Registered office: 73a, De Beauvour Road, N.1.

Lode Electric, Ltd.—Private company. Registered July 3rd. Capital, £2,000. Objects: To carry on the business of electrical equipment specialists, etc. Directors: P. Loach, 64, Somerville Road, Sutton Coldfield, and J. F. Loach, 528, Haslucks Green Road, Shirley, Birmingham. Secretary: A. Loach. Registered office: 65, Spooner Street, Vauxhall, Birmingham, 7.

C. B. Hemphill, Ltd.—Private company. Registered July 4th. Capital, £1,000. Objects: To carry on the business of electrical engineers and wireless engineers, general electrical installation contractors, etc. Directors: A. Heeley, 39 & 41, New Tupton, Chesterfield, and C. B. Hemphill, The Firs, Stretton, Derby. Registered office: 4, High Street, Clay Cross, Derbyshire.

Thomas (Electricals), Ltd.—Private company. Registered July 4th. Capital, £1,000. Objects: To carry on the business as indicated by the title. Directors: T. J. S. Morgan, 55, Glanmore Park Road, Swansea, and two others. Registered office: 22, Bridge Street, Haverfordwest.

Snelling & Bedford (Engineering), Ltd.—Private company. Registered July 4th. Capital, £1,500. Objects: To carry on the business of manufacturers and repairers of, and dealers in, dynamos, motors, armatures, magnetos and batteries, etc. Directors: L. C. Snelling, 101, The Drive, Bexley, Kent, and S. J. Bedford, 60, Bramerton Road, Beckenham, Kent. Registered office: 101, The Drive, Bexley, Kent.

Electro Installations (London), Ltd.—Private company. Registered July 4th. Capital, £1,500. Objects: To carry on the business of electricians, mechanical engineers, etc. Directors: L. A. C. Atkins, 28, Park View Road, Tottenham, N.17, and two others. Registered office: 116, Gloucester Place, W.1.

Liquidations

Read & Campbell, Ltd.—Meeting, August 30th at 14, Queen Victoria Street, London, E.C.4, to receive an account of the winding-up by the liquidator, Mr. R. A. Harting. This notice refers to the old company which went into voluntary liquidation on May 22nd, 1946, on the formation of the present company of the same name. All creditors of the company have been paid in full.

Bankruptcies

E. B. Page, electrical engineer, 10 and 12, John Street, Hyde, Cheshire.—Application for discharge to be heard on September 13th at the Town Hall, Ashton-under-Lyne.

STOCKS AND SHARES

AUGUST usually brings a sensible slackening of public interest in stocks and shares. The present year is unlikely to reverse the normal rule. Politics, at home and abroad, thrust their unwanted spokes into the wheel of Stock Exchange activities. Tragedies in Palestine contribute their melancholy influence to other factors making for quieter markets. Home Railway dividend announcements provided no surprises—and no fresh business. New issues have helped to keep interest alive in the industrial market.

The determined opposition to nationalization shown by the electricity supply companies had little effect upon their ordinary shares. Price changes are negligible. Electric Supply ordinary at 44s. and Electrical Finance at £3 are 6d. up.

The Home Railway companies have declared interim dividends at the same rates as those of a year ago. Southern Railway preferred and 5 per cent preference are 10s. down at 71 and 114½. Thomas Tillings at 52s. 6d. have fallen 1s. British Electric Traction deferred is 20 points lower at 1125.

Price Fluctuations

Cable & Wireless ordinary and preference have met at the common price of 113½. The debates in the House of Lords aroused lively interest. Canadian Marconis have gone back to 15s. Radio stocks are weaker. Decca and Pye deferred dropped back 2s. 6d. to 53s. 9d. and 38s. 9d. respectively. Scophony at 9s. 6d. are 1s. 6d. down, on sales in a market by no means anxious to take them. E.M.I. at 33s. 3d. have lost 1s. Dollar stocks fell back in correspondence with a slump in New York, Montreal Light & Power are 1½ down at 24.

The manufacturing and equipment group is fairly steady, but most of such changes as have occurred are downward. Chloride Electrical Storage retain their rise to £5; the chairman at last week's meeting gave a cheerful view of the company's prospects. A fall to 5 1/16 in General Electrics is partly due to the quotation being marked ex dividend. Tube Investments gave way to 116s. 3d. and British Insulated Callenders are 1s. 6d. lower at 46s. Ward & Goldstone have gained a florin at 50s. British Thermostat at 25s. 6d. are unaffected by the forthcoming issue of 4½ per cent preference shares at 21s.

Associated British Engineering

Associated British Engineering £1 shares at 57s. 6d. have held part of the rise which followed the announcement of the 12 per cent dividend and the proposed distribution of one Brush Electrical Engineering 5s. stock unit for every £1 ordinary stock unit of the company. Brush, at 11s. 6d., remain depressed by the assumption that some A.B.E. stockholders will be inclined to convert their bonus from scrip into cash. The latter company was known originally as Petters. In 1938, Brush Electrical purchased certain assets, plant and the company's name. In 1943 the Associated company sold a part of its Brush interests to finance other acquisitions.

Central Board Stocks

Curiosity is felt as to what may be expected to happen to the various issues of Central Electricity Board stock if, and when, the Government plans of nationalization are brought to a practical conclusion. The Consol market's assumption is that the Board's issues will come automatically into the circle of trustee securities, and achieve a dignity which they have never enjoyed, but for which they are eminently suited. Each of the stocks is specifically dated for repayment. Two carry 5 per cent interest; two, 4½ per cent; and the lowest rate is 3¼ per cent. No clue is available of the Government's intention in regard to these stocks. If, however, a guess in the dark may be permitted, consolidation of all the issues, due allowance being made for different dates of repayment and rates of interest, is at least conceivable.

English Electric

After changing hands up to 7s. 6d. premium, the new ordinary shares of English Electric, offered to stockholders at 57s. 6d., have been offered down to 3s. 9d. premium. The old shares are quoted at 61s. 6d. ex rights and interim dividend. The 1½ million new 3¾ per cent cumulative preference shares were offered publicly at par, holders of the company's other stocks being given special consideration in the matter of allotments. Security for this issue is of a high order. Assets cover the capital amount 5½ times, while average earnings over the last ten years are about nine times the annual dividend requirements.

Indigestion ?

Notwithstanding the difficulties imposed by the Capital Issues Committee, the recent outpouring of new issues sanctioned by the Committee has reached very considerable proportions. So far, the public appetite for new investments (and speculations) has been keen enough to ensure heavy over-subscription in the majority of cases. The starting of a market in newcomers at a premium is the order of the day. Success so pronounced as this has the obvious effect of encouraging more and more new issues, until the question comes to be asked —as it is to-day—How near are we to financial indigestion ? The noticeable slowing-down of Stock Exchange business lends point to the query. The answer depends to some extent upon the ability of the Government to uphold the cheap money policy which, every now and then, seems menaced by the maelstrom of world conditions. But the official control of the financial situation is very tight, and cheap money rates will undoubtedly remain for some time yet.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

AUTOMATIC Telephone & Electric Co., Ltd., and E. E. Comfort.—" Automatic switches as used in telephone systems." 17438. September 13th, 1944. (578720.)

Automatic Telephone & Electric Co., Ltd., and H. Gillett.—" Electrical plug and cord connecting arrangements." 22400. November 14th, 1944. (578721.)

R. C. Braithwaite and Metropolitan-Vickers Electrical Co., Ltd.—" Anti-friction bearings having fluid passages." 9375. May 28th, 1940. (578734.)

British Tabulating Machine Co., Ltd.—" Electrical devices for sensing holes in insulating sheet material." 19241/44. October 9th, 1943. (578794.)

British Thomson-Houston Co., Ltd., and W. J. Scott.—" Concentric line constructions for use with electron discharge devices." 3457. March 2nd, 1943. (578848.)

L. F. Broadway and E. C. Cork.—" High frequency electron discharge devices." 12639. August 6th, 1940. (578762.)

Carr Fastener Co., Ltd., and G. W. Clark.—" Holders for thermionic valves, plugs and like devices having projecting contact pins." 6860. April 13th, 1944. (578861.)

Cinch Manufacturing Corporation.—" Electrical contact sockets." 9687/44. June 18th, 1943. (578788.)

H. A. M. Clark.—" Electrical systems for determining the direction of movable objects." 37404. December 23rd, 1938. (578730.)

A. G. Clarke.—" Inductance devices of adjustable valve." 713. January 9th, 1945. (578828.)

E. K. Cole, Ltd., and L. W. D. Sharp.—" Means for supplying power to radio receivers." 11557. June 17th, 1944. (578823.)

G. E. Condliffe and H. A. M. Clark.—" Electrical systems for utilizing acoustic or electromagnetic vibratory energy." Cognate applications 16668/38, 17823/38, 21394/38 and 26479/38. June 3rd, 1938. (578729.)

M. Cook, W. O. Alexander and Imperial Chemical Industries, Ltd.—" Wrought metal electrical resistance materials." 15548. November 4th, 1942. (578774.)

General Electric Co., Ltd., and A. A. Chubb.—" Electrical communication apparatus." 6351. April 5th, 1944. (578708.)

General Electric Co., Ltd., and D. C. Espley.—" Apparatus for emitting or receiving short-wave radio signals." 10337. June 14th, 1940. (578737.)

General Electric Co., Ltd., and E. Gallizia.—" Anode arm for vapour electric arc convertors." 7183. June 6th, 1941. (578740.)

General Electric Co., Ltd., and F. C. F. Phillips.—" Instruments for measuring the frequency of an electrical oscillation." 8134. May 1st, 1944. (578818.) " Electrical frequency meters." 8135. May 1st, 1944. (Addition to 567571.) (578819.)

Igranic Electric Co., Ltd.—" Lifting magnets." 4021/44. March 4th, 1943. (578781.) " Controllers for electric motor-driven travelling devices." 11521/44. June 17th, 1943. (578792.)

Independent Pneumatic Tool Co.—" Portable hand held electrically driven tools." 19195/43. October 15th, 1942. (578755.)

R. E. Jennings and Foster Transformers & Switchgear, Ltd.—" Electrical means for regulating the amplitude of vibratory motion." 7205. April 19th, 1944. (578816.)

C. P. Johnson and Telegraph Condenser Co., Ltd.—" Mountings of electric terminals or the like." 8683. May 8th, 1944. (578863.)

Light Production Co., Ltd., and P. J. Hutchings.—" Float-operated switch gear for liquid level indicating and/or controlling." 7520. April 22nd, 1944. (578786.)

Liverpool Electric Cable Co., Ltd., R. F. D. Milner and J. T. Frost.—" Junction or sealing of electric cables." 3249. February 22nd, 1944. (578810.)

G. McAuley.—"Control units for electric cookers." 8645. May 8th, 1944. (578709.)

K. Norden.—" Holders for suspended fluorescent lamps." 2118/44. February 5th, 1943. (578701.)

J. Rogoff.—" Tool installed cable terminal and method of making same." 3120. February 19th, 1944. (578704.)

G. R. Shepherd (Westinghouse Electric International Co.).—" Heat-exchange apparatus." 899. January 17th, 1944. (578804.) " Power indicating or measuring devices." 6852. April 13th, 1944. (578859.) " Torque indicating or measuring devices." 6853. April 13th, 1944. (578860.)

Standard Telephones & Cables, Ltd.—" Telephone cord connectors." 1284/44. February 22nd, 1943. (Addition to 566205.) (578807.)

Standard Telephones & Cables, Ltd., and L. J. Heaton-Armstrong.—" Antenna systems for defining a guide path." 15326. October 30th, 1942. (578773.)

Standard Telephones & Cables, Ltd., and W. A. Beatty.—" Generation of time-modulated pulses." 5269. March 21st, 1940. (578732.)

Standard Telephones & Cables, Ltd., and A. J. Maddock.—" Drying of paints and the like by electric high frequency heating." 19382. November 19th, 1943. (578757.)

Standard Telephones & Cables, Ltd., B. B. Jacobsen and M. M. Levy.—" Electric pulse-generating circuits known as multi-vibrators." 8616. July 8th, 1941. (578690.)

W. Stern.—" Remote control of apparatus installed on sea remote from the shore." 15145. October 28th, 1942. (578772.) " Navigational systems using electric energy." 15511. November 3rd, 1942. (578844.)

Westinghouse Electric International Co.—" Fluid blast electric circuit interrupters." 2392/44. February 10th, 1943. (578780.) " Dielectric compositions and sealed electrical apparatus impregnated therewith." 15102/45. June 29th, 1944. (578869.)

G. W. Wiard.—" Electric fuses." 18232. November 3rd, 1943. (578801.)

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Adwick-le-Street.—August 23rd. Electricity Department. Cables, switchgear and transformers. (See this issue.)

Australia.—October 17th. 15,000-kW steam turbine and accessories. Spec. 412 (£22 first copy, others 10s. 6d.). H. Baskerville, City Electric Light Co., Ltd., Boundary Street, Brisbane (*Tenders*).

Bury.—August 16th. Borough Council. Electricity meters for one year. (See this issue.)

Devizes.—August 12th. Rural District Council. Electrical installations in eight cottages; P. R. Trapp, clerk, Maryport Chambers.

Dundee.—August 10th. Education Committee. Various works, including electrical and welding equipment at building for engineering courses. City quantity surveyor, 21, City Square.

Fraserburgh.—August 13th. Public Library Committee. Electric wiring of public library buildings, J. Noble, hon. secretary, Fraserburgh Public Library Committee, 51, Mid Street.

Manchester.—August 9th. Electricity Department. 33-kV, 11-kV and multicore control cables, Stuart Street power station. (July 26th.)

August 22nd. Pipework, supports, valves, and four motor driven pumps for Stuart Street power station. Two 10,000-kVA transformers for Sale substation. (July 26th.)

August 23rd. Public Health Department. Electric pumps. (July 26th.)

Morecambe and Heysham.—August 12th. Borough Council. Three 750-kVA transformers. (See this issue.)

Oldham.—August 31st. Electricity Department. Cable, earthenware ducts and cable covers. (See this issue.)

West Riding.—August 10th. Mental Hospitals Board. External and internal wiring of farm buildings and cottages on Stapleton Park estate, Darrington, Pontefract; G. L. Banner, Victoria Chambers, Wood Street, Wakefield.

Wilton.—August 31st. Town Council. Public lighting installation. Borough surveyor, Municipal Offices, Fugglestone House.

Yeovil.—August 22nd. Borough Council. Poles and electrical equipment in connection with trunk road lighting. (July 26th.)

Orders Placed

Battersea.—Baths Committee. Accepted. Installation of electric clock system at Latchmere baths (£313).—Synchronome.

Electricity Committee. Accepted. Electrical equipment for housing estate (£654).—William White & Co.

Bradford.—Housing Committee. Recommended. Electrical installations at 128 houses on the Eccleshill estate (£2,976).—J. Carter & Sons.

Bury. — Electricity Committee. Accepted. Concrete lighting standards.—Concrete Utilities; Stanton Ironworks; Revo Electric Co. Cables for twelve months.—Scottish Cables. Sodium lighting equipment.—Wardle Engineering Co.

Ilford.—Electricity Committee. Accepted. Lamp columns. 100 Gillingham type (£3 18s 6d each) and 100 C N type swan neck fittings (£1 9s each).—W. Lucy & Co. 20 standards complete with brackets (£16 5s each).—Revo.

London.—Metropolitan Water Board. Accepted. Two electric pumps for Hoddesdon pumping station (£3,792).—Hathorn, Davey & Co. Switchboards for Ferry Lane and Stoke Newington pumping stations (£1,645).—Millns Electrical Co. Electrical installation at Hammersmith works (£1,296).—Clough, Smith & Co.

Manchester. — Generation Sub-Committee. Accepted. Fluorescent lamps for control room lighting.—G.E.C. Motors and starting equipment.—B.T.H. Co. Lift for boiler house.—Etchells, Congdon & Muir (sub-contractors for lift motor and motor-generator, Lancashire Dynamo & Crypto).

Distribution Sub-Committee. Accepted. Two batteries and charging equipment.—Tudor Accumulator Co.

Newcastle-on-Tyne.—City Council. Accepted. Electric lift at the transport and electricity offices (£820).—Austin Lifts.

Poplar.—Contracts Committee. Accepted. 2,000 25-A meters (£9,925) and six circuit breakers (£387).—Metropolitan-Vickers. Battery for electric vehicle (£88).—Crompton Parkinson.

St. Marylebone.—Electricity Committee. Accepted. Three-phase banks of transformers (£2,072 each).—British Electric Transformer Co. Switchgear for equipping new substations.—Ferguson, Pailin. Cables for three years.—Telegraph Construction & Maintenance Co.; B.I. Callender's Cables; Enfield Cables. Cable laying (£1,596).—Enfield Cables. Meters for twelve months.—Chamberlain & Hookham; Ferranti.

Tynemouth.—Corporation. Accepted. Installation of electricity in 24 "Orlit" houses.—J. B. Thomson.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—Houses (256), Kincorth, for Town Council; city architect, 11, Broad Street.

Arnold (Notts).—Houses (121), Ravenswood estate, for U.D.C.; surveyor, Arnot Hill House.

Ayr.—Houses (120), Mainholm (£163,500); burgh surveyor.

Battersea.—Flats (30), Honeywell Road (£49,618); borough engineer.

Bedfordshire.—Police houses (22); county architect, Shire Hall, Bedford.

Bedworth.—Houses (30), Furnace Fields, for U.D.C.; S. J. Oldham, architect, 4, Queen Victoria Road, Coventry.

Bewdley.—Permanent houses (26), Bark Hill; S. J. Rowe, borough engineer, Municipal Offices.

Billingham.—New offices and laboratory, Belasis Lane; Imperial Chemical Industries, Ltd.

Bingley.—Factory, Castlefields Lane; J. Rhodes & Son.

Birmingham.—Maternity hospital, Perry Barr (£426,500); city engineer.

Municipal restaurant, Newhall Street (£50,350); city engineer.

Blaydon (Co. Durham).—Houses (100), Hallgarth estate; Stephen Easten, Ltd.; builders, Westgate Grange, Newcastle.

Bournemouth.—Warehouse and offices, Kinson Road; Southern Utilities, Ltd.

Brighton.—Houses (50), Parkside estate (£1,312 each); L. J. Speight & Partners, Ltd.

Flats (28), and 62 houses, Hollingbury estate (£94,679); Rice & Sons, Ltd.

Cambridge.—Permanent houses (80), Trumpington housing site; borough surveyor, The Guildhall.

Castle Ward.—Houses (120), Hazlerigg; R.D.C. surveyor.

Crook (Co. Durham).—Houses (112), at Willington; Page, Son & Hill, architects, 75, King Street, South Shields.

Darlington.—Houses (142), Nickstream Lane and Tennyson Gardens; E. Minors, borough engineer.

Doncaster.—Houses (58), Wheatley Park and Intake; estates surveyor, 15, South Parade.

Dursley.—Houses (40), Synwell Farm, Wotton-under-Edge; I. M. Nicholson, council's engineer and surveyor, Council Offices, Kingshill.

Edinburgh.—Rebuilding Theatre Royal, damaged by fire; H. Collins, theatre proprietor, Glasgow.

Gateshead.—Factories for the Danish Bacon Co., Ltd., and Landauer Co., Ltd., Team Valley estate; Cackett, Burns Dick & McKellar, architects, 21, Ellison Place, Newcastle-on-Tyne.

Glendale (Northumberland).—Houses (22), Oliver Road extension; R.D.C. surveyor.

Grangemouth.—Permanent houses (88), Dalgrain and Fouldubs (£120,240); burgh surveyor.

Hackney.—Flats (28), and 19 terraced houses, Sandringham Road, E.8; Norman & Dawbarn, architects, 5, Gower Street, London, W.C.1.

Hampstead.—Flats (102), Kilburn Vale (£155,200); E. Armstrong, L.C.C. architect.

Hendon.—Dwellings (78), Watling estate for L.C.C. (£88,338); F. Troy & Co., Ltd.

Lancaster.—Crematorium, Powder House Lane; city engineer.

Leeds.—Cinema, Belle Isle Road; South Leeds Amusement, Ltd.

Lerwick.—Houses (82), for Town Council; A. A. Foote, architect, 9, York Place, Edinburgh.

Lewisham.—Temporary buildings, Colfe's Grammar School (£40,375); L.C.C. architect.

Macclesfield.—Houses (102), Midway Farm, Poynton (£107,073); H. Owen & Son, Ltd., contractors, 35, Dialstone Lane, Stockport.

Marlow (Bucks).—Houses (54), Newton Road housing site; C. Kelvin Smith, surveyor, Council Offices, Court Garden.

Mexborough.—Permanent houses (80), Highwoods estate; J. Chambers, surveyor, Council Offices.

Newcastle-on-Tyne.—Factory extensions, C. Leach Ltd., drysalters, Barrack Road; T. Hutchinson, Wansbeck House, Scotswood Road.

Nottingham.—Houses (228), Western Boulevard (£296,874); Bodill & Sons, Ltd., builders, Sherwood Street, Portland Road, Hucknall.

Poole.—Permanent houses (130), Tucker's Lane and Hamilton Road, Hamworthy; J. R. Barron, borough engineer, Municipal Buildings.

Poplar.—Flats (48), Blair Street; borough engineer.

Sale.—Houses (88), Carrington Lane, for Town Council; borough surveyor, Town Hall.

Southall.—Studio extensions, Gladstone Road; Cromwell Film Corporation, Ltd.

Stockton-on-Tees.—Houses (96), Fairfield Road; E. Hills & Son, builders, Norton Road.

Strood.—Houses (52), Higham and Frindsbury (£65,409); G. E. Wallis & Sons, Ltd., builders, Maidstone.

Thornaby-on-Tees.—Houses (50), Lanehouse Road estate; P. Brown, borough engineer.

Tottenham.—Houses (68), Allington estate (£72,400); Jackson, Ltd.

Tynemouth.—Police houses (20); borough engineer, 19, Howard Street, North Shields.

Wallsend-on-Tyne.—Permanent houses (100), for Town Council; borough surveyor, Town Hall.

Warrington.—Permanent houses (132), on ten sites; S. C. Oxley, surveyor, Council Offices, Museum Street.

Whitley Bay.—Houses (32), Seaton Sluice; Temple & Pyle, builders, Whitley Bay.

Wycombe.—Houses (40), at Princes Risborough; Brocklehurst & Cooper, Council's architects, Crendon Street, High Wycombe.

Wylam (Northumberland).—Houses (26), for Hexham R.D.C.; W. Dixon & Son, 1, Collingwood Street, Newcastle-on-Tyne.

I.E.E. Students' Outings

THE first post-war summer outing of the I.E.E. Bristol Students' Section will be held on August 23rd when a cruise will be made up the River Avon. For those living in Bath, transport to and from Bristol has been arranged. Tickets for the cruise (2s. 6d.) and for the Bath coach (2s. 6d.), can be obtained from Mr. J. W. Dorrinton, hon. secretary, 45, Trelawney Road, Bristol, 6.

The North-Eastern Students' Section of the I.E.E. is visiting the short circuit testing station of A. Reyrolle & Co., Ltd., Hebburn-on-Tyne on August 17th. Those wishing to take part should notify Mr. S. A. Walker, visits secretary, 12, Deuchar Street, Newcastle-on-Tyne.